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LOGIQ e Basic User Manual

Operating Documentation

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Regulatory Requirements

This product complies with regulatory requirements of the following European Directive 93/42/EEC concerning medical devices.

CE 0197

This manual is a reference for the LOGIQ e. It applies to all versions of the R4.x.x software for the LOGIQ e ultrasound system.

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List of Effective Pages

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Rev. 1	April 7, 2006	Initial Release
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List of Effective Pages

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Title Page	Rev. 2	Chapter 9	Rev. 2
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Regulatory Requirements	Rev. 2	Chapter 11	Rev. 2
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Chapter 7	Rev. 2	Index	Rev. 2
Chapter 8	Rev. 2		

Please verify that you are using the latest revision of this document. Information pertaining to this document is maintained on ePDM (GE Medical Systems electronic Product Data Management). If you need to know the latest revision, contact your distributor, local GE Sales Representative or in the USA call the GE Ultrasound Clinical Answer Center at 1 800 682 5327 or 1 262 524 5698.

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Regulatory Requirements

Conformance Standards

The following classifications are in accordance with the IEC/EN 60601-1:6.8.1:

- According to 93/42/EEC Medical Device Directive, this is Class IIa Medical Device.
- According to IEC/EN 60601-1, Equipment is Class I, Type B with BF or CF Applied Parts.
- According to CISPR 11, this is Group 1, Class A ISM Equipment.
- According to IEC 60529, the footswitch rate is IPx1 (FSU-2001) or IPx8 (MKF 2-MED GP26).

This product complies with the regulatory requirement of the following:

- Council Directive 93/42/EEC concerning medical devices: the CE label affixed to the product testifies compliance to the Directive.

  The location of the CE marking is shown in Chapter 2 of this manual.

  European registered place of business:

  GE Medical Systems Europe
  Quality Assurance and safety Regulatory Manager
  BP 34
  F 78533 Buc Cedex, France
  Tel: +33 (0) 1 30 70 4040

Conformance Standards (continued)

- International Electrotechnical Commission (IEC).
  - IEC/EN 60601-1 Medical Electrical Eqiupment, Part 1 General Requirements for Safety.
  - IEC/EN 60601-1-1 Safety requirements for medical electrical systems.
  - IEC/EN 60601-1-2 Electromagnetic compatibility - Requirements and tests.
  - IEC/EN 60601-1-4 Programmable electrical medical systems.
  - IEC 60601-2-37 Medical electrical equipment. Particular requirements for the safety of ultrasonic medical diagnostic and monitoring equipment.
  - IEC 61157 Declaration of acoustic output parameters.
- International Organization of Standards (ISO)
  - ISO 10993-1 Biological evaluation of medical devices.
- Underwriters' Laboratories, Inc. (UL), an independent testing laboratory.
  - UL 2601-1 Medical Electrical Equipment, Part 1 General Requirements for Safety.
- Canadian Standards Association (CSA).
  - CSA 22.2, 601.1 Medical Electrical Equipment, Part 1 General Requirements for Safety.
- NEMA/AIUM Acoustic Output Display Standard (NEMA US-3, 1998).
- Medical Device Good Manufacturing Practice Manual issued by the FDA (Food and Drug Administration, Department of Health, USA).

Certifications

- General Electric Medical Systems is ISO 9001 and ISO 13485 certified.

Original Documentation

- The original document was written in English.

Country-specific Approval

- Japan

  MHLW Certified Number: 218ABBZX00060000

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Chapter 1

Introduction

This chapter consists of information concerning indications for use/contraindications, contact information and how this documentation is organized.

System Overview

Attention

This manual contains necessary and sufficient information to operate the system safely. Advanced equipment training may be provided by a factory trained Applications Specialist for the agreed-upon time period.

Read and understand all instructions in this manual before attempting to use the LOGIQ e system.

Keep this manual with the equipment at all times. Periodically review the procedures for operation and safety precautions.

Documentation

LOGIQ e documentation consists of three manuals:

- The Basic User Manual (TRANSLATED) and Online Help (TRANSLATED) provides information needed by the user to operate the system safely. It describes the basic functions of the system, safety features, operating modes, measurements/calculations, probes, and user care and maintenance.

NOTE: Probe information displayed on screen examples does not necessarily reflect the probes available on your ultrasound system. Please refer to the Probes chapter for a listing of available probes and features.

- The Advanced Reference Manual (ENGLISH ONLY) contains data tables, such as OB and Acoustic Output tables.
- The Quick Guide (TRANSLATED) provides descriptions of basic system features and operation. It is intended to be used in conjunction with the Basic User Manual in order to provide the information necessary to operate the system safely. Quick Cards may also be provided with additional feature information.
- The User Guide is a condensed user instruction guide (translated into Swedish, Danish, Russian, Greek, Dutch, Finnish, Norwegian, and Polish).
- AIUM Booklet

NOTE: The documentation kit provides the Quick Guide and Release Notes on paper and electronically and the Basic User Manual and Advanced Reference Manual are only provided in electronic format. The media includes English and all translations. Paper documentation may be ordered by using a form in the Quick Guide.

The LOGIQ e manuals are written for users who are familiar with basic ultrasound principles and techniques. They do not include sonographic training or detailed clinical procedures.

Principles of Operation

Medical ultrasound images are created by computer and digital memory from the transmission and reception of mechanical high-frequency waves applied through a transducer. The mechanical ultrasound waves spread through the body, producing an echo where density changes occur. For example, in the case of human tissue, an echo is created where a signal passes from an adipose tissue (fat) region to a muscular tissue region. The echoes return to the transducer where they are converted back into electrical signals.

These echo signals are highly amplified and processed by several analog and digital circuits having filters with many frequency and time response options, transforming the high-frequency electrical signals into a series of digital image signals which are stored in memory. Once in memory, the image can be displayed in real-time on the image monitor. All signal transmission, reception and processing characteristics are controlled by the main computer. By selection from the system control panel, the user can alter the characteristics and features of the system, allowing a wide range of uses, from obstetrics to peripheral vascular examinations.

Transducers are accurate, solid-state devices, providing multiple image formats. The digital design and use of solid-state components provides highly stable and consistent imaging performance with minimal required maintenance. Sophisticated design with computer control offers a system with extensive features and functions which is user-friendly and easy to use.

Indications for Use

The LOGIQ e is intended for use by a qualified physician for ultrasound evaluation. Specific clinical applications and exam types include:

- Fetal/Obstetrics
- Abdominal (including GYN)
- Pediatric
- Small Organ (including breast, testes, thyroid)
- Neonatal Cephalic
- Adult Cephalic
- Cardiac (adult and pediatric)
- Peripheral Vascular
- Intraoperative (abdominal, thoracic and peripheral)
- Musculo-skeletal Conventional
- Urology (including prostate)
- Transrectal
- Transvaginal

△ CAUTION

This machine should be used in compliance with law. Some jurisdictions restrict certain uses, such as gender determination.

Contraindication

The LOGIQ e ultrasound system is not intended for ophthalmic use or any use causing the acoustic beam to pass through the eye.

Prescription Device

CAUTION: United States law restricts this device to sale or use by, or on the order of a physician.

Contact Information

Contacting GE Medical Systems Ultrasound

For additional information or assistance, please contact your local distributor or the appropriate support resource listed on the following pages:

INTERNET

http://www.gehealthcare.com

http://www.gehealthcare.com/usen/ultrasound/products/probe_care.html

USA

GE Healthcare TEL: (1) 800-437-1171
Ultrasound Service Engineering FAX: (1) 414-721-3865
P.O. Box 414
Milwaukee, WI 53201

Clinical Questions

For information in the United States, Canada, Mexico and parts of the Caribbean, call the Customer Answer Center
TEL: (1) 800-682-5327 or (1) 262-524-5698

In other locations, contact your local Applications, Sales or Service Representative.

Service Questions

For service in the United States, call GE CARES

TEL: (1) 800-437-1171

In other locations, contact your local Service Representative.

Accessories Catalog Requests

To request the latest GE Accessories catalog or equipment brochures in the United States, call the Response Center

TEL: (1) 800-643-6439

In other locations, contact your local Applications, Sales or Service Representative.

Contacting GE Medical Systems Ultrasound (continued)

Placing an Order

To place an order, order supplies or ask an accesory-related question in the United States, call the GE Access Center

TEL: (1) 800-472-3666

In other locations, contact your local Applications, Sales or Service Representative.

CANADA

GE Medical Systems TEL: (1) 800-664-0732
Ultrasound Service Engineering
9900 Innovation Drive
Wauwatosa, WI 53226
Customer Answer Center TEL: (1) 262-524-5698

LATIN & SOUTH AMERICA

GE Medical Systems TEL: (1) 262-524-5300
Ultrasound Service Engineering
9900 Innovation Drive
Wauwatosa, WI 53226
Customer Answer Center TEL: (1) 262-524-5698

EUROPE

GE Ultraschall TEL: 0130 81 6370 toll free
Deutschland GmbH & Co. KG TEL: (33) 130.831.300
Beethovenstrasse 239 FAX: (49) 212.28.02.431
Postfach 11 05 60
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GE Ultrasound Asia (Singapore) TEL: 65-291 8528
Service Department - Ultrasound FAX: 65-272-3997
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Singapore 169730

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Rio Lerma #302, 1° y 2° Pisos TEL: (5) 228-9600
Colonia Cuauhtemoc FAX: (5) 211-4631
06500-Mexico, D.F.

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Chapter 2

Safety

Describes the safety and regulatory information pertinent for operating this ultrasound system.

Safety Precautions

Precaution Levels

Icon description

Various levels of safety precautions may be found on the equipment and different levels of concern are identified by one of the following flag words and icons which precede the precautionary statement.

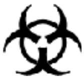
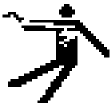
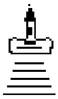
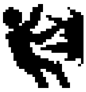
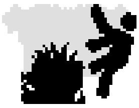
⚠ DANGER	Indicates that a specific hazard is known to exist which through inappropriate conditions or actions will cause: • Severe or fatal personal injury • Substantial property damage.
⚠ WARNING	Indicates that a specific hazard is known to exist which through inappropriate conditions or actions may cause: • Severe personal injury • Substantial property damage.
△ CAUTION	Indicates that a potential hazard may exist which through inappropriate conditions or actions will or can cause: • Minor injury • Property damage.
NOTE:	*Indicates precautions or recommendations that should be used in the operation of the ultrasound system, specifically:* • *Maintaining an optimum system environment* • *Using this Manual* • *Notes to emphasize or clarify a point.*

Hazard Symbols

Icon Description

Potential hazards are indicated by the following icons:

Table 2-1: Potential Hazards

Icon	Potential Hazard	Usage	Source
	• Patient/user infection due to contaminated equipment.	• Cleaning and care instructions • Sheath and glove guidelines	ISO 7000 No. 0659
	• Electrical micro-shock to patient, e.g., ventricular	• Probes • ECG, if applicable • Connections to back panel	
	• Patient injury or tissue damage from ultrasound radiation.	• ALARA, the use of Power Output following the ‘as low as reasonably achievable’ principle	
	• Risk of explosion if used in the presence of flammable anesthetics.	• Flammable anesthetic	
	• Patient/user injury or adverse reaction from fire or smoke. • Patient/user injury from explosion and fire.	• Replacing fuses • Outlet guidelines	

Important Safety Considerations

The following topic headings (Patient Safety, and Equipment and Personnel Safety) are intended to make the equipment user aware of particular hazards associated with the use of this equipment and the extent to which injury can occur if precautions are not observed. Additional precautions may be provided throughout the manual.

△ CAUTION

Improper use can result in serious injury. The user must be thoroughly familiar with the instructions and potential hazards involving ultrasound examination before attempting to use the device. Training assistance is available from GE Medical Systems if needed.

The equipment user is obligated to be familiar with these concerns and avoid conditions that could result in injury.

Patient Safety

Related Hazards

WARNING The concerns listed can seriously affect the safety of patients undergoing a diagnostic ultrasound examination.

Patient identification	Always include proper identification with all patient data and verify the accuracy of the patient's name and ID numbers when entering such data. Make sure correct patient ID is provided on all recorded data and hard copy prints. Identification errors could result in an incorrect diagnosis.
Diagnostic information	Equipment malfunction or incorrect settings can result in measurement errors or failure to detect details within the image. The equipment user must become thoroughly familiar with the equipment operation in order to optimize its performance and recognize possible malfunctions. Applications training is available through the local GE representative. Added confidence in the equipment operation can be gained by establishing a quality assurance program.

Related Hazards (continued)

Mechanical hazards

The use of damaged probes can result in injury or increased risk of infection. Inspect probes often for sharp, pointed, or rough surface damage that could cause injury or tear protective barriers. Become familiar with all instructions and precautions provided with special purpose probes.

Electrical Hazard

A damaged probe can also increase the risk of electric shock if conductive solutions come in contact with internal live parts. Inspect probes often for cracks or openings in the housing and holes in and around the acoustic lens or other damage that could allow liquid entry. Become familiar with the probe's use and care precautions outlined in *Probes and Biopsy*.

CAUTION

Ultrasound transducers are sensitive instruments which can easily be damaged by rough handling. Take extra care not to drop transducers and avoid contact with sharp or abrasive surfaces. A damaged housing, lens or cable can result in patient injury or serious impairment or operation.

CAUTION

Ultrasound can produce harmful effects in tissue and potentially result in patient injury. Always minimize exposure time and keep ultrasound levels low when there is no medical benefit. Use the principle of ALARA (As Low As Reasonably Achievable), increasing output only when needed to obtain diagnostic image quality. Observe the acoustic output display and be familiar with all controls affecting the output level. See the *Bioeffects section* of the *Acoustic Output chapter* in the *Advanced Reference Manual* for more information.

Related Hazards (continued)

Training It is recommended that all users receive proper training in applications before performing them in a clinical setting. Please contact the local GE representative for training assistance.

ALARA training is provided by GE Application Specialists. The ALARA education program for the clinical end-user covers basic ultrasound principles, possible biological effects, the derivation and meaning of the indices, ALARA principles, and examples of specific applications of the ALARA principle.

Equipment and Personnel Safety

Related Hazards

WARNING

This equipment contains dangerous voltages that are capable of serious injury or death.

If any defects are observed or malfunctions occur, stop operating the equipment and perform the proper action for the patient. Inform a qualified service person and contact a Service Representative for information.

There are no user serviceable components inside the console. Refer all servicing to qualified service personnel only.

WARNING

Only approved and recommended peripherals and accessories should be used.

All peripherals and accessories must be securely mounted to the LOGIQ e.

DANGER

The concerns listed below can seriously affect the safety of equipment and personnel during a diagnostic ultrasound examination.

Explosion Hazard

Risk of explosion if used in the presence of flammable anesthetics.

Related Hazards (continued)

Electrical Hazard

To avoid injury:

- Do not remove protective covers. No user serviceable parts are inside. Refer servicing to qualified service personnel.
- To assure adequate grounding, connect the attachment plug to a reliable (hospital grade) grounding outlet (having equalization conductor ⏚).
- Never use any adaptor or converter of a three-prong-to-two-prong type to connect with a mains power plug. The protective earth connection will loosen.
- Do not place liquids on or above the console. Spilled liquid may contact live parts and increase the risk of shock.

CAUTION

Do not use this equipment if a safety problem is known to exist. Have the unit repaired and performance verified by qualified service personnel before returning to use.

Smoke & Fire Hazard

The system must be supplied from an adequately rated electrical circuit. The capacity of the supply circuit must be as specified.

Biological Hazard

For patient and personnel safety, be aware of biological hazards while performing invasive procedures. To avoid the risk of disease transmission:

- Use protective barriers (gloves and probe sheaths) whenever possible. Follow sterile procedures when appropriate.
- Thoroughly clean probes and reusable accessories after each patient examination and disinfect or sterilize as needed. Refer to *Probes and Biopsy* for probe use and care instructions.
- Follow all infection control policies established by your office, department or institution as they apply to personnel and equipment.

Related Hazards (continued)

△ CAUTION

Contact with natural rubber latex may cause a severe anaphylactic reaction in persons sensitive to the natural latex protein. Sensitive users and patients must avoid contact with these items. Refer to package labeling to determine latex content and FDA's March 29, 1991 Medical Alert on latex products.

△ CAUTION

Archived data is managed at the individual sites. Performing data backup (to any device) is recommended.

△ CAUTION

DO NOT use high-frequency surgical equipment with the LOGIQ e.

Device Labels

Label Icon Description

The following table describes the purpose and location of safety labels and other important information provided on the equipment.

Table 2-2: Label Icons

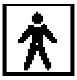
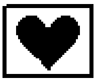
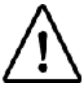
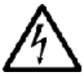
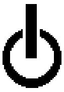
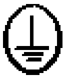
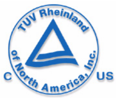
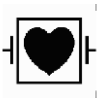
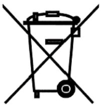
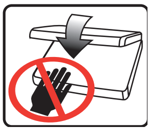
Label/Icon	Purpose/Meaning	Location
Identification and Rating Plate	• Manufacture’s name and address • Date of manufacture • Model and serial numbers • Electrical ratings (Volts, Amps, phase, and frequency)	See Figure 2-3/Figure 2-4 for location information. AC Adapter Label.
Type/Class Label	Used to indicate the degree of safety or protection.	
IP Code (IPX1 or IPX8) IPX1: FSU-2001 IPX8: MKF 2-MED GP26	Indicates the degree of protection provided by the enclosure per IEC60 529. IPX1 cannot be used in an operating room environment. IPX8 can be used in an operating room environment.	Bottom of Footswitch
	Type BF Applied Part (man in the box) symbol is in accordance with IEC 878-02-03.	Beside the probe connector
	Type CF Applied Part (heart in the box) symbol is in accordance with IEC 60878-02-03.	ECG marked Type CF or probes
	“ATTENTION” - Consult accompanying documents” is intended to alert the user to refer to the operator manual or other instructions when complete information cannot be provided on the label.	Various
	“CAUTION” - Dangerous voltage” (the lightning flash with arrowhead) is used to indicate electric shock hazards.	Various
	“ON” indicates the power on position of the power switch. **CAUTION:** This Power Switch **DOES NOT ISOLATE** Mains Supply.	See the Console Overview section for location information.

Table 2-2: Label Icons

Label/Icon	Purpose/Meaning	Location
	“Protective Earth” indicates the protective earth (grounding) terminal.	Inside of AC adapter
	NRTL Listing and Certification Mark is used to designate conformance to nationally recognized product safety standards. The Mark bears the name and/or logo of the testing laboratory, product category, safety standard to which conformity is assessed and a control number.	Bottom
	Type CF Defib-Proof Applied Part (heart in the box with paddle) symbol is in accordance with IEC 60878-02-06.	ECG Module
	This symbol indicates that waste electrical and electronic equipment must not be disposed of as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment.	Bottom
	When closing the LCD cover, use caution to avoid injuring hands or fingers as there is a closing mechanism which allows the LCD cover to automatically close.	Bottom

Label Icon Description (continued)

Classifications

Type of protection against electric shock

- Class I Equipment—LOGIQ e Console with AC Adapter (*1)

Degree of protection against electric shock

- Type BF Applied part (*2) (for Probes marked with BF symbol)
- Type CF Applied part (*3) (for ECG marked with CF symbol)

Continuous Operation

System is Ordinary Equipment (IPX0)

Footswitch is IPX1 (FSU-2001) or IPX8 (MKF 2-MED GP26)

1. Class I Equipment

EQUIPMENT in which protection against electric shock does not rely on BASIC INSULATION only, but includes a protective earth ground. This additional safety precaution prevents exposed metal parts from becoming LIVE in the event of an insulation failure.

2. Type BF Applied Part

TYPE BF APPLIED PART providing a specified degree of protection against electric shock, with particular regard to allowable LEAKAGE CURRENT.

Table 2-3: Type BF Equipment

	Normal Mode	Single fault condition
Patient leakage current	Less than 100 microA	Less than 500 microA

3. Type CF Applied Part

TYPE CF APPLIED PART providing a degree of protection higher than that for Type BF Applied Part against electric shock particularly regarding allowable LEAKAGE CURRENTS.

Table 2-4: Type CF Equipment

	Normal Mode	Single fault condition
Patient leakage current	Less than 10 microA	Less than 50 microA

EMC (Electromagnetic Compatibility)

NOTE: *This equipment generates, uses and can radiate radio frequency energy. The equipment may cause radio frequency interference to other medical and non-medical devices and radio communications. To provide reasonable protection against such interference, this product complies with emissions limits for a Group 1, Class A Medical Devices Directive as stated in EN 60601-1-2. However, there is no guarantee that interference will not occur in a particular installation.*

NOTE: *If this equipment is found to cause interference (which may be determined by turning the equipment on and off), the user (or qualified service personnel) should attempt to correct the problem by one or more of the following measure(s):*

- *reorient or relocate the affected device(s)*
- *increase the separation between the equipment and the affected device*
- *power the equipment from a source different from that of the affected device*
- *consult the point of purchase or service representative for further suggestions.*

NOTE: *The manufacturer is not responsible for any interference caused by using other than recommended interconnect cables or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the users' authority to operate the equipment.*

NOTE: *To comply with the regulations on electromagnetic interference for a Class A FCC Device, all interconnect cables to peripheral devices must be shielded and properly grounded. Use of cables not properly shielded and grounded may result in the equipment causing radio frequency interference in violation of the FCC regulations.*

EMC Performance

All types of electronic equipment may characteristically cause electromagnetic interference with other equipment, either transmitted through air or connecting cables. The term EMC (Electromagnetic Compatibility) indicates the capability of equipment to curb electromagnetic influence from other equipment and at the same time not affect other equipment with similar electromagnetic radiation from itself.

EMC Performance (continued)

Proper installation following the service manual is required in order to achieve the full EMC performance of the product.

The product must be installed as stipulated in 4.2, Notice upon Installation of Product.

In case of issues related to EMC, please call your service personnel.

The manufacturer is not responsible for any interference caused by using other than recommended interconnect cables or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the users' authority to operate the equipment.

⚠ CAUTION

Do not use devices which intentionally transmit RF signals (cellular phones, transceivers, or radio controlled products), other than those supplied by GE (wireless microphone, broadband over power lines, for example) unless intended for use with this system, in the vicinity of this equipment as it may cause performance outside the published specifications.

Keep power to these devices turned off when near this equipment.

Medical staff in charge of this equipment is required to instruct technicians, patients and other people who may be around this equipment to fully comply with the above regulation.

EMC Performance (continued)

Portable and mobile radio communications equipment (e.g. two-way radio, cellular/cordless telephones and similar equipment) should be used no closer to any part of this system, including cables, than determined according to the following method:

Table 2-5: Portable and mobile radio communications equipment distance requirements

Frequency Range:	**150 kHz - 80 MHz**	**80 MHz - 800 MHz**	**800 MHz - 2.5 GHz**
Calculation Method:	d=[3.5/V_1] square root of P	d = [3.5/E_1] square root of P	d = [7/E_1] square root of P
Where: d= separation distance in meters, P = rated power of the transmitter, V_1=compliance value for conducted RF, E_1 = compliance value for radiated RF			
If the maximum transmitter power in watts is rated	**The separation distance in meters should be**		
5	2.6	2.6	5.2
20	5.2	5.2	10.5
100	12.0	12.0	24.0

Notice upon Installation of Product

Separation distance and effect from fixed radio communications equipment: field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast, and TV broadcast transmitter cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the ultrasound system is used exceeds the applicable RF compliance level as stated in the immunity declaration, the ultrasound system should be observed to verify normal operation. If abnormal operation is observed, additional measures may be necessary, such as re-orienting or relocating the ultrasound system or using an RF shielded examination room may be necessary.

1. Use either power supply cords provided by GE Medical Systems or ones designated by GE Medical Systems. Products equipped with a power source plug should be plugged into the fixed power socket which has the protective grounding conductor. Never use any adaptor or converter to connect with a power source plug (e.g. three-prong-to-two-prong converter).
2. Locate the equipment as far away as possible from other electronic equipment.
3. Be sure to use only the cables provided by or designated by GE Medical Systems. Connect these cables following the installation procedures (e.g. wire power cables separately from signal cables).
4. Lay out the main equipment and other peripherals following the installation procedures described in the Option Installation manuals.

General Notice

1. Designation of Peripheral Equipment Connectable to This Product.

   The equipment indicated in Chapter 18 can be hooked up to the product without compromising its EMC performance.

   Avoid using equipment not designated in the list. Failure to comply with this instruction may result in poor EMC performance of the product.

2. Notice against User Modification

   The user should never modify this product. User modifications may cause degradation in EMC performance.

   Modification of the product includes changes in:

   a. Cables (length, material, wiring, etc.)
   b. System installation/layout
   c. System configuration/components
   d. Securing system parts (cover open/close, cover screwing)

Peripheral Update for EC countries

The following is intended to provide the users in EC countries with updated information concerning the connection of the LOGIQ e to image recording and other devices or communication networks.

Peripheral used in the patient environment

The LOGIQ e has been verified for overall safety, compatibility and compliance with the following on-board image recording devices:

- Sony UP-D897MD B/W Printer
- Sony UP-D23MD Color Printer

The LOGIQ e may also be used safely while connected to devices other than those recommended above if the devices and their specifications, installation, and interconnection with the system conform to the requirements of IEC/EN 60601-1-1.

⚠ CAUTION

The connection of equipment or transmission networks other than as specified in the user instructions can result in an electric shock hazard or equipment malfunction. Substitute or alternate equipment and connections requires verification of compatibility and conformity to IEC/EN 60601-1-1 by the installer. Equipment modifications and possible resulting malfunctions and electromagnetic interference are the responsibility of the owner.

General precautions for installing an alternate off-board, remote device or a network would include:

1. The added device(s) must have appropriate safety standard conformance and CE Marking.
2. There must be adequate mechanical mounting of the device and stability of the combination.
3. Risk and leakage current of the combination must comply with IEC/EN 60601-1.
4. Electromagnetic emissions and immunity of the combination must conform to IEC/EN 60601-1-2.

Peripheral Update for EC countries (continued)

Peripheral used in the non-patient environment

The LOGIQ e has also been verified for compatibility, and compliance for connection to a local area network (LAN) via a wireless LAN, provided the LAN components are IEC/EN 60950 compliant.

The LOGIQ e has also been verified for compatibility, and compliance for connection to a DVD-RW via the system USB port, provided the DVD-RW is IEC/EN 60950 compliant.

General precautions for installing an alternate off-board, remote device or a network would include:

1. The added device(s) must have appropriate safety standard conformance and CE Marking.
2. The added device(s) must be used for their intended purpose having a compatible interface.

Declaration of Emissions

This system is suitable for use in the following environment. The user must assure that it is used only in the electromagnetic environment as specified.

Table 2-6: Declaration of Emissions

Emission Type	Compliance	Electromagnetic Environment
CISPR 11 RF Emissions	Group 1 Class A	This system uses RF energy only for its internal function. Therefore, RF emissions are very low and are not likely to cause any interference in nearby electronic equipment. It is suitable for use in all establishments, other than domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.

Declaration of Immunity

This system is suitable for use in the following environment. The user must assure that the system is used according to the specified guidance and only in the electromagnetic environment listed.

Table 2-7: Declaration of Immunity

Immunity Type	Equipment Capability	Regulatory Acceptable Level	EMC Environment and Guidance
IEC 61000-4-2 Static discharge (ESD)	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%. Mains power quality should be that of a typical commercial and/or hospital environment. If the user requires continued operation during power mains interruptions, it is recommended that the system be powered from a UPS or a battery. NOTE: UT is the a.c. mains voltage prior to application of the test level. Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial and/or hospital environment. Separation distance to radio communication equipment must be maintained according to the method below. Interference may occur in the vicinity of equipment marked with the symbol: Image degradation or interference may occur due to conducted RF noise on the equipment mains power supply or other signal cable. Such interference is easily recognized and distinguishable from patient anatomy and physiological waveforms. Interference of this type may delay the examination without affecting diagnostic accuracy. Additional mains/ signal RF isolation or filtering may be needed if this type interference occurs frequently.
IEC 61000-4-4 Electrical fast transient/burst	± 2 kV for mains ± 1 kV for SIP/ SOP	± 2 kV for mains ± 1 kV for SIP/SOP	
IEC 61000-4-5 Surge Immunity	± 1 kV differential ± 2 kV common	± 1 kV differential ± 2 kV common	
IEC 61000-4-11 Voltage dips, short interruptions and voltage variations on mains supply	$< 50_T$ (> 95% dip) for 0.5 cycle; 400_T (60 0ip) for 5 cycles; 700_T (30 0ip) for 25 cycles; $< 50_T$ (>95% dip) for 5 sec	$< 50_T$ (> 95% dip) for 0.5 cycle; 400_T (60 0ip) for 5 cycles; 700_T (30 0ip) for 25 cycles; $< 50_T$ (>95% dip) for 5 sec	
IEC 61000-4-8 Power frequency (50/ 60 Hz) magnetic field	3 A/m	3 A/m	
IEC 61000-4-6 Conducted RF	$3\ V_{RMS}$ 150 kHz - 80 MHz	$3\ V_{RMS}$ 150 kHz - 80 MHz	
IEC 61000-4-3 Radiated RF	3 V/m 80 MHz - 2.5 GHz	3 V/m 80 MHz - 2.5 GHz	
NOTE: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people. If noise generated from other electronic equipment is near the probe's center frequency, noise may appear on the image. Good power line isolation is required.			

Patient Environmental Devices

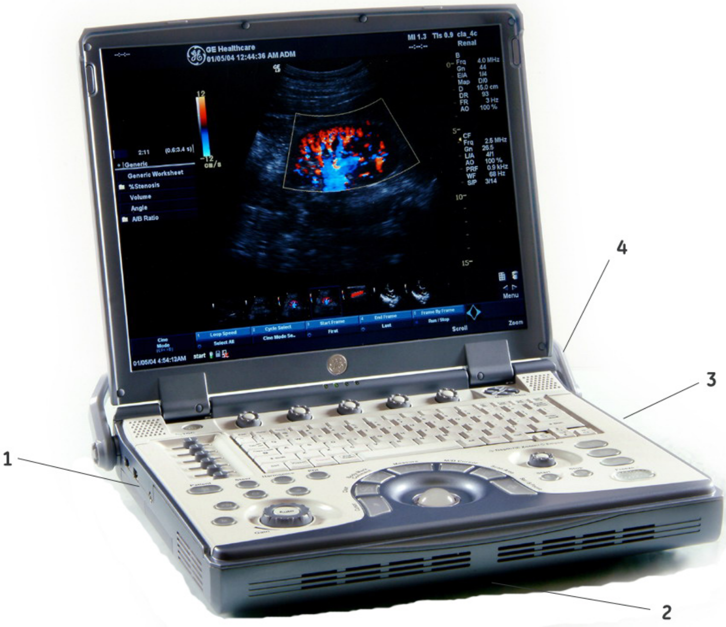


Figure 2-1. Patient Environmental Devices

1. Left side:
    - 2 USB Ports—Peripheral devices, Printers (B/W, Color and USB), Memory Stick, Footswitch, Wireless LAN Adapter, USB Hub, ECG
    - 1 Earphone Port
2. Bottom side: Lithium-ion battery port
3. Right side: Probe port, Security lock
4. Rear panel:
    - 1 VGA Port.
    - 1 Network Port
    - 1 Docking Port

Acceptable Devices

The Patient Environmental devices shown on the previous page are specified to be suitable for use within the PATIENT ENVIRONMENT.

CAUTION

DO NOT connect any probes or accessories without approval by GE within the PATIENT ENVIRONMENT.

See 'Peripheral Update for EC countries' on *page 2-19 for more information.*

Unapproved Devices

CAUTION

DO NOT use unapproved devices.

If devices are connected without the approval of GE, the warranty will be INVALID.

Any device connected to the LOGIQ e must conform to one or more of the requirements listed below:

1. IEC standard or equivalent standards appropriate to devices.
2. The devices shall be connected to PROTECTIVE EARTH (GROUND).

Accessories, Options, Supplies

CAUTION

Unsafe operation or malfunction may result. Use only the accessories, options and supplies approved or recommended in these instructions for use.

Acoustic Output

Located on the upper right section of the system display monitor, the acoustic output display provides the operator with real-time indication of acoustic levels being generated by the system. See the *Acoustic Output chapter* in the *Advanced Reference Manual* for more information. This display is based on NEMA/AIUM Standards for Real-time Display of Thermal and Mechanic Acoustic Output Indices on Diagnostic Ultrasound Equipment.

Acoustic Output Display Specifications

The display consists of three parts: Thermal Index (TI), Mechanical Index (MI), and a relative Acoustic Output (AO) value. Although not part of the NEMA/AIUM standard, the AO value informs the user of where the system is operating within the range of available output.

The TI and MI are displayed at all times. The TI display starts at a value of 0.0 and increments in steps of 0.1 The MI display values between 0 and 0.4 increment in steps of 0.01 and for values greater than 0.4, increments in steps of 0.1.

Thermal Index

Depending on the examination and type of tissue involved, the TI parameter will be one of three types:

- **Soft Tissue Thermal Index (TIS)**. Used when imaging soft tissue only, it provides an estimate of potential temperature increase in soft tissue.
- **Bone Thermal Index (TIB)**. Used when bone is near the focus of the image as in the third trimester OB examination, it provides an estimate of potential temperature increase in the bone or adjacent soft tissue.
- **Cranial Bone Thermal Index (TIC)**. Used when bone is near the skin surface as in transcranial examination, it provides an estimate of potential temperature increase in the bone or adjacent soft tissue.

Acoustic Output Display Specifications (continued)

Mechanical Index MI recognizes the importance of non-thermal processes, cavitation in particular, and the Index is an attempt to indicate the probability that they might occur within the tissue.

Changing the Thermal Index Type You can select the displayed TI type on Utility -> Imaging -> B-Mode. This preset is application dependent so each application could specify a different TI type.

Display precision is ±0.1 and accuracy is ±50%. Accuracy of the power output displayed value on the Top/Sub Menu is ±2% in B-Mode and ±10% in all other modes.

Controls Affecting Acoustic Output

The potential for producing mechanical bioeffects (MI) or thermal bioeffects (TI) can be influenced by certain controls.

Direct. The Acoustic Output control has the most significant effect on Acoustic Output.

Indirect. Indirect effects may occur when adjusting controls. Controls that can influence MI and TI are detailed under the Bioeffects portion of each control in the Optimizing the Image chapter.

Always observe the Acoustic Output display for possible effects.

Best practices while scanning

HINTS

Raise the Acoustic Output only after attempting image optimization with controls that have no effect on Acoustic Output, such as Gain and TGC.

NOTE: *Refer to the sections in Chapter 5 for a complete discussion of each control.*

WARNING

Be sure to have read and understood control explanations for each mode used before attempting to adjust the Acoustic Output control or any control that can effect Acoustic Output.

Acoustic Output Hazard

Use the minimum necessary acoustic output to get the best diagnostic image or measurement during an examination. Begin the exam with the probe that provides an optimum focal depth and penetration.

Acoustic Output Default Levels

In order to assure that an exam does not start at a high output level, the LOGIQ e initiates scanning at a reduced default output level. This reduced level is preset programmable and depends upon the exam category and probe selected. It takes effect when the system is powered on or ***New Patient*** is selected.

To modify acoustic output, adjust the Power Output level on the Top/Sub Menu.

Warning Label Locations

LOGIQ e warning labels are provided in English.

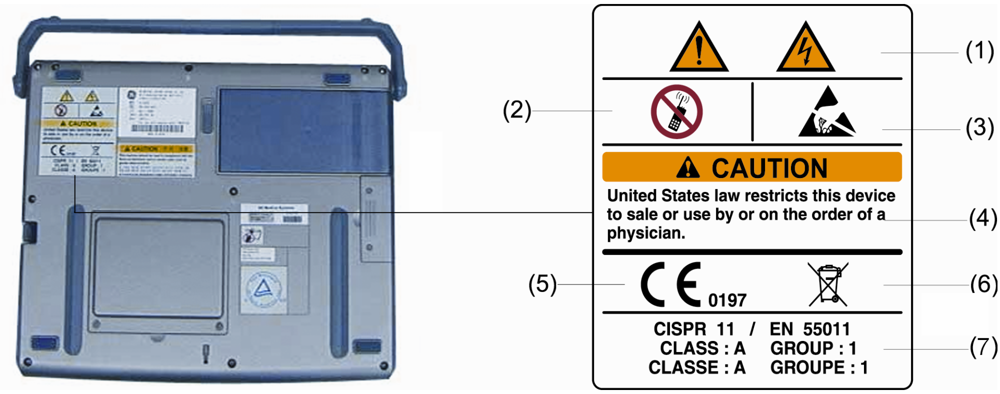
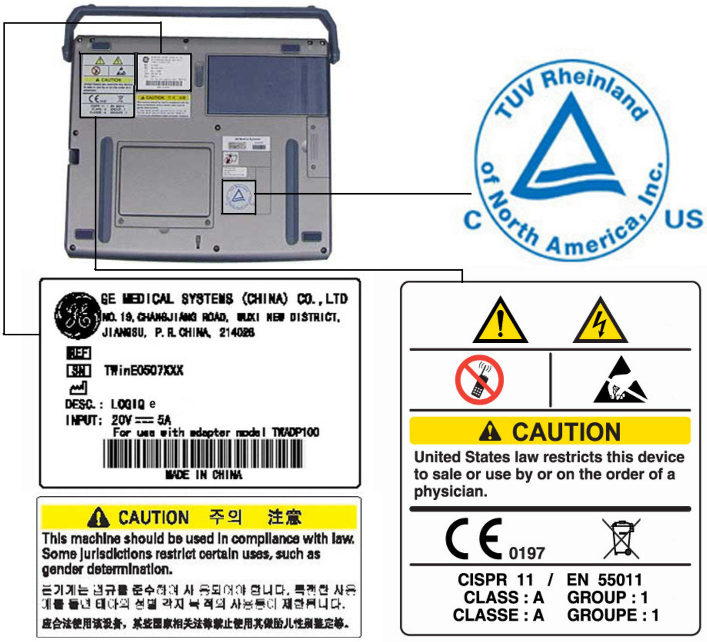

(1)
(2)
(3)
CAUTION
United States law restricts this device to sale or use by or on the order of a physician.
(4)
(5)
0197
(6)
CISPR 11 / EN 55011
CLASS : A GROUP : 1
CLASSE : A GROUPE : 1
(7)

Figure 2-2. Label location explanations

Table 2-8: Label Location Explanations

1. Possible shock hazard. Do not remove covers or panels. No user serviceable parts are inside. Refer servicing to qualified service personnel.
2. Do not use the following devices near this equipment: cellular phone, radio receiver, mobile radio transimitter, radio controlled toy, etc. Use of these devices near this equipment could cause this equipment to perform outside the published specifications. Keep power to these devices turned off when near this equipment.
3. Be careful of static
4. Prescription Device (For U.S.A. Only)
5. The CE Mark of Conformity indicates this equipment conforms with the Council Directive 93/42/EEC.
6. WEEE Label
7. CISPR **CAUTION**: The LOGIQ e conforms to the CISPR11, Group 1, Class A of the international standard for Electromagnetic disturbance characteristics.

Warning Label Locations (continued)



GE MEDICAL SYSTEMS (CHINA) CO., LTD
NO. 19, CHANGJIANG ROAD, WUXI NEW DISTRICT,
JIANGSU, P. R. CHINA, 214028
REF
SN TWinE0507XXX
DESC. : LOGIQ e
INPUT: 20V ⎓ 5A
For use with adapter model TWADP100
MADE IN CHINA

CAUTION 주의 注意
This machine should be used in compliance with law. Some jurisdictions restrict certain uses, such as gender determination.
应合法使用该设备，某些国家相关法律禁止使用其做胎儿性别鉴定等。

CAUTION
United States law restricts this device to sale or use by or on the order of a physician.

CE 0197

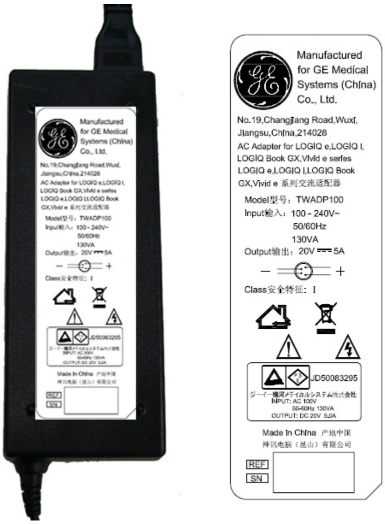
CISPR 11 / EN 55011
CLASS : A GROUP : 1
CLASSE : A GROUPE : 1

Figure 2-3. TUV and Identification/Rating Plate Label Location

Table 2-9: Rating Plate Explanations

🏭	**Date of manufacture:** The date could be a year, year and month, or year, month and day, as appropriate. See ISO 8601 for date formats.
REF	**Catalog or model number**
SN	**Serial number**
⎓	**Direct Current:** For products to be powered from a DC supply

Warning Label Locations (continued)



Manufactured for GE Medical Systems (China) Co., Ltd.

No.19,Changjiang Road,Wuxi, Jiangsu,China,214028

AC Adapter for LOGIQ e,LOGIQ i, LOGIQ Book GX,Vivid e series

LOGIQ e,LOGIQ i,LOGIQ Book GX,Vivid e 系列交流适配器

Model型号：TWADP100

Input输入：100 - 240V~
50/60Hz
130VA

Output输出：20V ⎓ 5A

Class安全特征：I

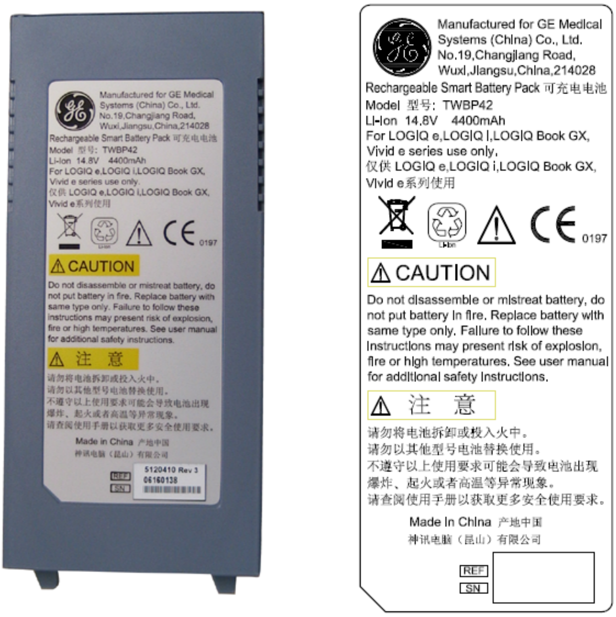
JD50083295

ジーイー横河メディカルシステム株式会社
INPUT: AC 100V
50-60Hz 130VA
OUTPUT: DC 20V 5.0A

Made In China 产地中国
神讯电脑（昆山）有限公司

REF
SN

Figure 2-4. AC Adapter Label



Manufactured for GE Medical Systems (China) Co., Ltd. No.19,Changjiang Road, Wuxi,Jiangsu,China,214028

Rechargeable Smart Battery Pack 可充电电池

Model 型号：TWBP42

Li-Ion 14.8V 4400mAh

For LOGIQ e,LOGIQ i,LOGIQ Book GX, Vivid e series use only.

仅供 LOGIQ e,LOGIQ i,LOGIQ Book GX, Vivid e系列使用

0197

⚠ CAUTION

Do not disassemble or mistreat battery, do not put battery in fire. Replace battery with same type only. Failure to follow these instructions may present risk of explosion, fire or high temperatures. See user manual for additional safety instructions.

⚠ 注 意

请勿将电池拆卸或投入火中。
请勿以其他型号电池替换使用。
不遵守以上使用要求可能会导致电池出现爆炸、起火或者高温等异常现象。
请查阅使用手册以获取更多安全使用要求。

Made In China 产地中国
神讯电脑（昆山）有限公司

REF
SN

Figure 2-5. Battery Label

Chapter 3

Preparing the System for Use

Describes the site requirements, console overview, system positioning/transporting, powering on the system, adjusting the display monitor, probes and operator controls.

Site Requirements

Introduction

NOTE: *Only qualified physicians or sonographers should perform ultrasound scanning on human subjects for medical diagnostic reasons. Request training, if needed.*

The LOGIQ e does not contain any operator serviceable internal components. Ensure that unauthorized personnel do not tamper with the unit.

Perform regular preventive maintenance. See ‘System Care and Maintenance’ on *page 18-9 for more information.*

Maintain a clean environment. Turn off, and if possible, disconnect the system before cleaning the unit. See ‘Cleaning the system’ on *page 18-11 for more information.*

Never set liquids on the unit to ensure that liquid does not drip into the control panel or unit.

Before the system arrives

NOTICE This medical equipment is approved, in terms of the prevention of radio wave interference, to be used in hospitals, clinics and other institutions which are environmentally qualified. The use of this equipment in an inappropriate environment may cause some electronic interference to radios and televisions around the equipment.

Ensure that the following is provided for the new system:

- A separate power outlet with a 6 amp circuit breaker for 220-240 VAC or a 10 amp circuit breaker for 100-120 VAC.
- Take precautions to ensure that the console is protected from electromagnetic interference.

  Precautions include:

  - Operate the console at least 15 feet away from motors, typewriters, elevators, and other sources of strong electromagnetic radiation.
  - Operation in an enclosed area (wood, plaster or concrete walls, floors and ceilings) helps prevent electromagnetic interference.
  - Special shielding may be required if the console is to be operated in the vicinity of radio broadcast equipment.

Environmental Requirements

The system should be operated, stored, or transported within the parameters outlined below. Either its operational environment must be constantly maintained or the unit must be turned off.

Table 3-1: System Environmental Requirements

	Operational	Storage	Transport
Temperature	10 - 40 degrees C 50 - 104 degrees F	-5 - 50 degrees C 23 - 122 degrees F	-5 - 50 degrees C 23 - 122 degrees F
Humidity	30 - 75% non-condensing	10 - 90% non-condensing	10 - 90% non-condensing
Pressure	700 - 1060hPa	700 - 1060hPa	700 - 1060hPa

Acclimation Time

After being transported, the unit requires one hour for each 2.5 degree increment its temperature is below 10 degree C or above 40 degree C.

Table 3-2: System Acclimation Time Chart

Degree C	60	55	50	45	40	35	30	25	20	15	10
Degree F	140	131	122	113	104	95	86	77	68	59	50
hours	8	6	4	2	0	0	0	0	0	0	0
Degree C	5	0	-5	-10	-15	-20	-25	-30	-35	-40	
Degree F	41	32	23	14	5	-4	-13	-22	-31	-40	
hours	2	4	6	8	10	12	14	16	18	20	

Console Overview

Console graphics

The following are illustrations of the console:

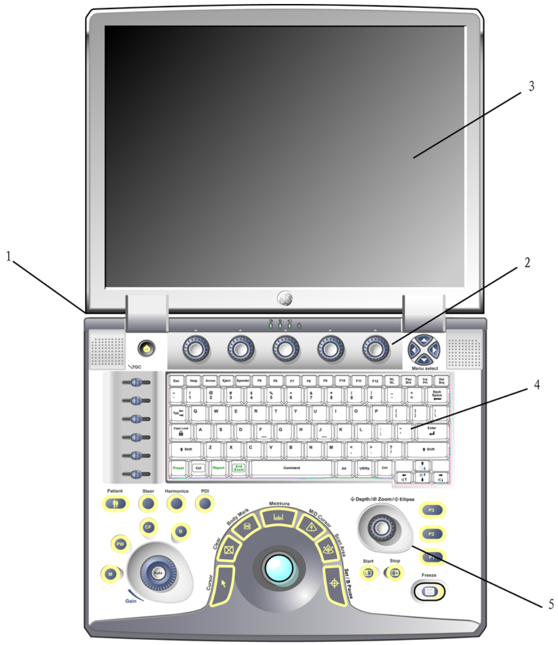


Figure 3-1. LOGIQ e System (opened view)

1. Handle
2. Soft Menu (use same as menu key)
3. LCD
4. Alphanumeric keys
5. Control Panel

Console graphics (continued)

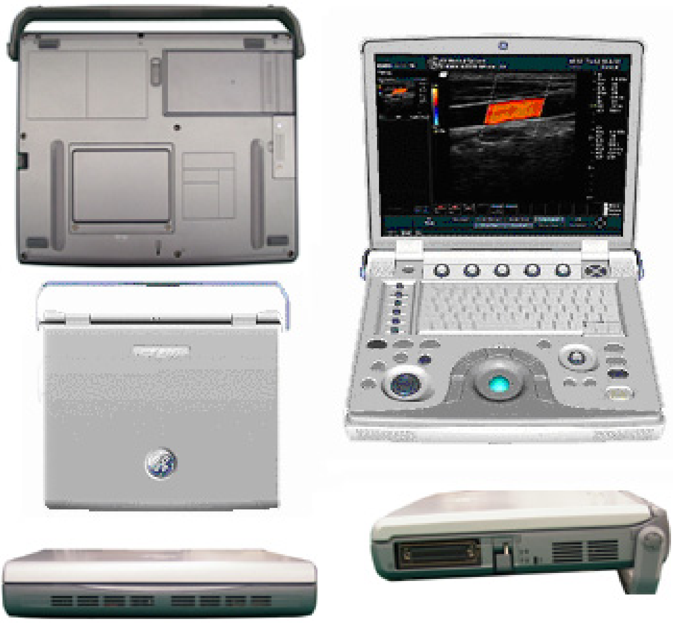


Figure 3-2. LOGIQ e System (side views)

CAUTION

Do not push objects into air vents and openings of LOGIQ e. Doing so can cause fire or electric shock by shorting out interior components.

Battery

The lithium ion battery provides power when an AC power source is not available. A battery in the battery bay is standard with the LOGIQ e. Lithium ion batteries last longer than conventional batteries and do not require replacement as often. You can expect one hour of battery life with a single fully charged battery.

The lithium ion technology used in your LOGIQ e's battery is significantly less hazardous to the environment than the lithium metal technology used in some other batteries (such as watch batteries). Used batteries should not be placed with common household waste products. Contact local authorities for the location of a chemical waste collection program nearest you.

NOTE: *The battery is designed to work with LOGIQ e systems only. Only use the batteries authorized by GE.*

WARNING

- The battery has a safety device. Do not disassemble or alter the battery.
- Charge the batteries only when the ambient temperature is between 0 and 50 degrees C (32 and 122 degrees F) and discharge the batteries between 0 and 60 degrees C (32 and 140 degrees F).
- Do not short-circuit the battery by directly connecting the negative terminals with metal objects.
- Do not heat the battery or discard it in a fire.
- Do not expose the battery to temperature over 60 degrees C (140 degrees F). Keep it away from fire and other heat sources.
- Do not charge the battery near a heat source, such as a fire or heater.
- **Do not leave the battery in direct sunlight.**
- Do not pierce the battery with a sharp object, hit it, or step on it.
- Do not use a damaged battery.
- Do not solder a battery.
- Do not connect the battery to an electrical power outlet.

Battery (continued)

WARNING

If the LOGIQ e is not being used on a monthly basis, the battery needs to be removed during the lengthy non-use period.

CAUTION

To avoid the battery bursting, igniting, or fumes from the battery causing equipment damage, observe the following precautions:

- Do not immerse the battery in water or allow it to get wet.
- Do not put the battery into a microwave oven or pressurized container.
- If the battery leaks or emits an odor, remove it from all possible flammable sources.
- If the battery emits an odor or heat, is deformed or discolored, or in a way appears abnormal during use, recharging or storage, immediately remove it and stop using it. If you have any questions about the battery, consult GE or your local representative.
- Short term (less than one month) storage of battery pack:
  - Store the battery in a temperature range between 0 degrees C (32 degrees F) and 50 degrees C (122 degrees F).

Battery (continued)

CAUTION

- Long term (3 months or more) storage of battery pack:
  - Store the battery in a temperature range between -20 degrees C (-4 degrees F) and 45 degrees C (113 degrees F)
  - Upon receipt of the LOGIQ e and before first time usage, it is highly recommended that the customer performs one full discharge/charge cycle. If the battery has not been used for >2 months, the customer is recommended to perform one full discharge/charge cycle. It is also recommended to store the battery in a shady and cool area with FCC (full current capacity).
  - One Full Discharge/Charge Cycle Process:
    1. Full discharge of battery to let the LOGIQ e automatically shut down.
    2. Charge the LOGIQ e to 100% FCC (full current capacity).
    3. Discharge of LOGIQ e for complete shut down (takes one hour for discharge).
  - When storing packs for more than 6 months, charge the pack at least once during the 6 month timeframe to prevent leakage and deterioration in performance.
- Use only GE recognized batteries.

Battery (continued)

View current battery status

When the system is running, there is a battery icon in the system status bar.

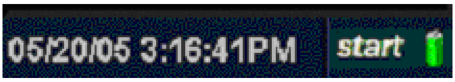
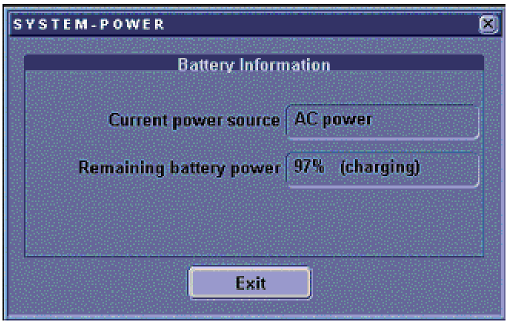


Figure 3-3. Battery icon

When you select this icon, the following appears:



Current power source AC power

Remaining battery power 97% (charging)

Figure 3-4. Battery Status Message

Current power source–displays the current power source, AC power or Battery.

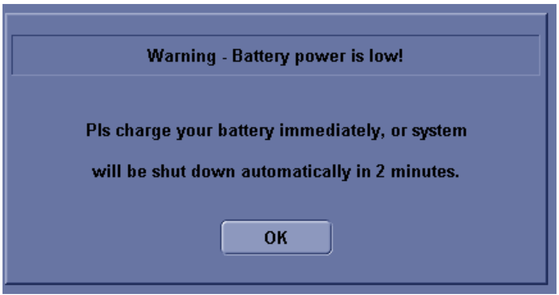
Total battery power remaining–displays the current power remaining capacity. When there is no battery, “Battery not present” appears. When using a battery, it’s current capacity in percent appears “current capacity (unit: percent)”. If the battery is not in use, it states “current capacity (charging)”.

Warning information–displays warning information when battery power is low. See Figure 3-5.

Battery (continued)

Battery power low warning

If the battery is in use and the battery power is low, a warning message appears to warn the user that the battery power is low and that it needs to be charged.



Warning - Battery power is low!

Pls charge your battery immediately, or system will be shut down automatically in 2 minutes.

Figure 3-5. Low battery power warning

NOTE: *When the battery power is low and the user cannot charge the battery in time, the system automatically shuts down in 2 minutes. This protects the whole system. You need to save all unsaved data before the system shuts down or you may lose useful information.*

AC Adapter

CAUTION

Do not use an AC adapter without approval by GE.

Be sure that nothing rests on the AC adapter's power cable and that the cable is not located where it can be tripped over or stepped on.

Place the AC adapter in a ventilated area, such as a desk, when you use it to run LOGIQ e. Do not cover the AC adapter with paper or other items that will reduce cooling; do not use the AC adapter inside a carrying case.

Peripheral/Accessory Connection

Peripheral/Accessory Connector Panel

LOGIQ e peripherals and accessories can be properly connected using the rear and side panels.

△ CAUTION

Each outer (case) ground line of peripheral/accessory connectors are **Earth Grounded**.

Signal ground lines are Not Isolated.

△ CAUTION

For compatiblity reasons, use only GE approved probes, peripherals or accessories.

DO NOT connect any probes or accessories without approval by GE.

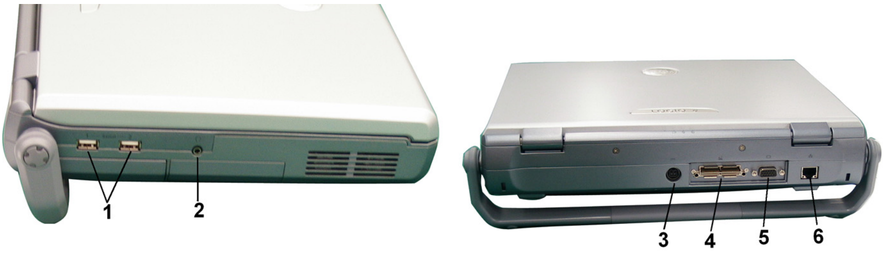


Figure 3-6. Peripheral/Accessory Connector Panel

1. 2 USB Ports for Printers (B/W, Color and USB), Memory Stick, Footswitch, DVD-RW, Wireless LAN Adapter, USB Hub, ECG
2. Earphone Port
3. Port for DC In (AC Adapter)
4. Docking Port
5. VGA Port
6. Network Port

Peripheral/Accessory Connector Panel (continued)

NOTE: The USB devices should be connected to the LOGIQ e first, power on the USB devices before turning on the LOGIQ e.

CAUTION The connection of equipment or transmission networks other than as specified in these instructions can result in electric shock hazard. Alternate connections will require verification of compatibility and conformity to IEC/EN 60601-1-1 by the installer.

Footswitch (Option)

Use only the GE recommended footswitch. The footswitch may be used as select keys.

Use the footswitch to freeze the real-time image. Use the footswitch as P1, P2 and P3 buttons on the keyboard.

The footswitch connection is located on the USB port.

CAUTION Do NOT connect the footswitch to USB Hub.

ECG (Option)

△ CAUTION

- ECG electrodes should not make contact with other conductive parts, including earth.
- After the defibrillator stimulates the patient, the ECG needs 4 to 5 seconds for recovery.
- The quality of the ECG trace depends on the stability and conductivity of the electrodes during the test, especially during high stages when the patient's movements can cause artifacts.
- Make sure that the lead wires do not swing.

△ CAUTION

The device is not waterproof. Do not expose the device to water or any kind of liquid. Maintain in a dry place:

- The exterior of the recorder may be wiped clean with a soft cloth. Do not use harsh cleaning agents to clean the unit. Do not immerse the unit in any liquid.
- Clean the cables with a hospital approved cleaning procedure such as those recommended by AAMI or AORN. Wiping the cables with a solution of soap and water followed by a rinse with water is a simple yet effective method to clean the cables. Do not immerse cables in water.
- Worn or damaged patient cables are the most common cause of poor ECG signals. ECG signals (or wave patterns) that consistently contain noise or artifact may suggest need for ECG wire or cable replacement.
- Store the device in a dry place.
- Always protect the recorder from coming into contact with moisture. In rain or snow conditions, protect the recorder from bad weather elements by wearing the recorder inside a coat.

NOTE: For information on ECG installation, refer to the LOGIQ e Peripheral Installation Instruction.

ECG (Option) (continued)

Electrode Placement The ECG cable has triple color-coded electrode connectors on the end. Each electrode cable hooks up to the appropriate stick-on electrode by a color-coded clip type connector.

Table 3-3: ECG Lead Placement

Lead	Patient Cable Marking		Position on Patient
	AHA	IEC	
I	RA (White)	R (Red)	Right Arm
II	LA (Black)	L (Yellow)	Left Arm
III	RL (Green)	N (Black)	Right Leg

Table 3-4: ECG Technical Specifications

Feature	Specification
Size [mm]	85x45x22 mm (+/- 0.5 mm)
Power consumption	USB 5V supply
Current	80 mA +/-10%
ECG samples/sec	1000
A/D bits	12 (2.44 uV/LSB)
Defibrillation protection	Built in
Patient Leads	Detachable 3 leads (IEC or AHA)
CMMR	> 80 dB
Input resistance	> 10 Mohm
Signal snamic range	10mV (-5 to +5 mV)
Patient isolation	4000V
Patient leakage current	< 10 uA
Frequency range (-3db)	0.05 - 150 Hz
Safety standard	IEC 60601-1, EN 60601-2, IEC 60601-2-27
Operating temperature	0 to 70 degrees C
Storing temperature	(-65) to 150 degrees C
Humidity	< 80%

Peripherals Connection

1. Connect the B/W printer to the system. The B/W printer can be properly connected using the USB Port 1 or 2.

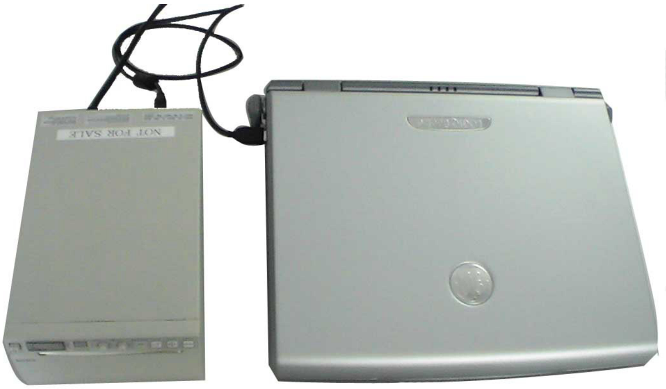


Figure 3-7. B/W Printer Connection

2. Connect the DVD-RW to the system. The DVD-RW can be properly connected using the USB Port 1 or 2.

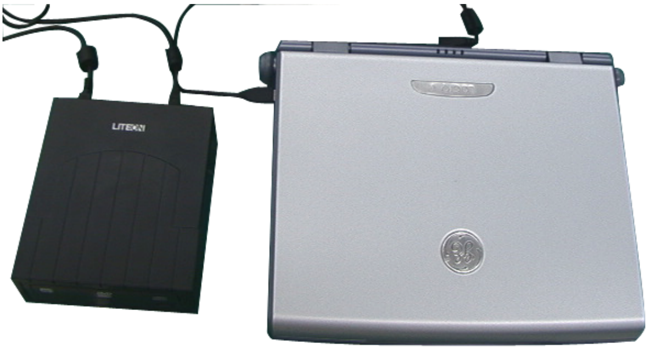


Figure 3-8. DVD-RW Connection

NOTE: Do not connect the DVD-RW to the system while scanning.

Peripherals Connection (continued)

3. Connect the footswitch to the system. The footswitch can be properly connected using the USB Port 1 or 2.

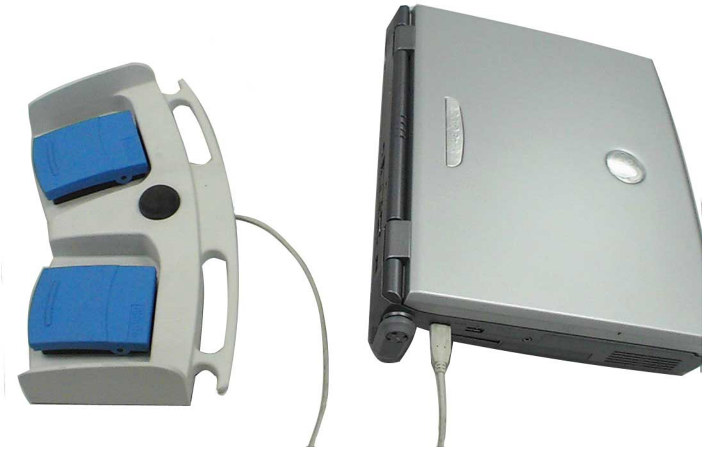


Figure 3-9. Footswitch Connection

4. Connect the Wireless LAN Adapter to the system. The wireless LAN adapter can be properly connected using the USB Port 1 or 2.

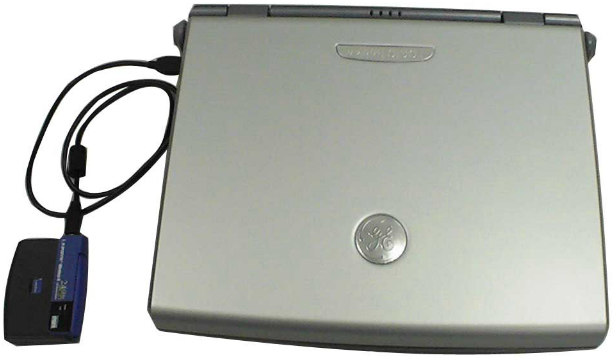


Figure 3-10. Wireless LAN Connection

Peripherals Connection (continued)

5. Connect the USB Memory to the system. The USB Memory can be properly connected using USB Port 1 or 2.

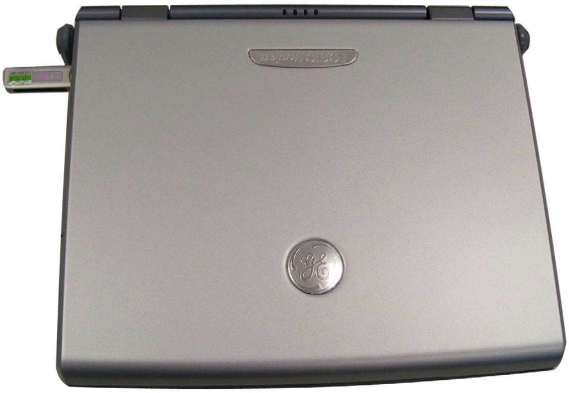


Figure 3-11. USB Memory Connection

6. Connect the HP460 Printer to the system. The HP460 Printer can be properly connected using USB Port 1 or 2.

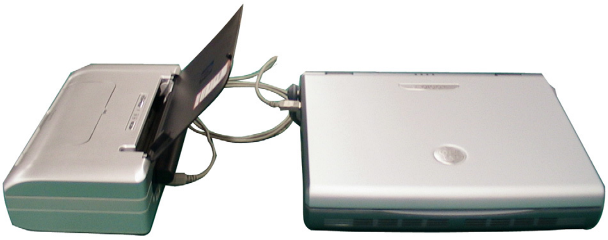


Figure 3-12. HP460 Printer Connection

Peripherals Connection (continued)

7. Connect the Color Printer to the system. The Color Printer can be properly connected using USB Port 1 or 2.

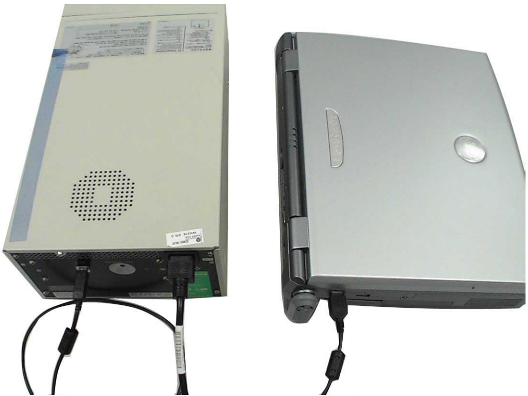


Figure 3-13. Color Printer Connection

8. Connect the ECG to the system. The ECG can be properly connected using USB Port 1 or 2.

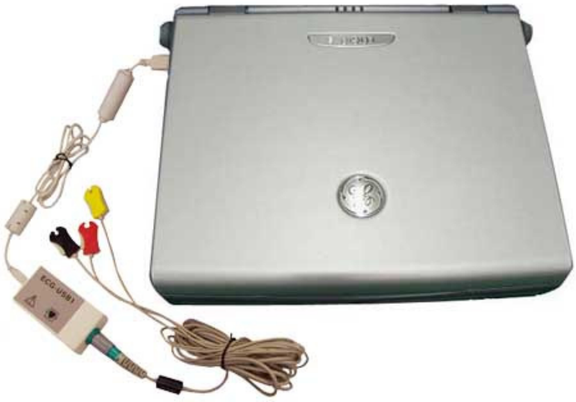


Figure 3-14. ECG Connection

NOTE: Please refer to the operation manual of each peripheral for information needed by the user to operate the system safely.

For detailed installation information, please refer to the LOGIQ e Peripheral Installation Instruction manual.

System Positioning/Transporting

Moving the System

When moving or transporting the system, follow the precautions below to ensure the maximum safety for personnel, the system, and other equipment.

Before moving the system

1. Shut down the system.See ‘Power Off’ on *page 3-29 for more information.*
2. Unplug the power cord (if the system is plugged in).
3. Disconnect all cables from off-board peripheral devices (external printer, etc.) from the console.

   To prevent damage to the Power Cord, DO NOT pull excessively on the cord or make sharp bends while wrapping.
4. Store all probes in their original cases or in soft cloth or foam to prevent damage.
5. Store sufficient gel and other essential accessories in the special storage case.

When moving the system

1. Always use the handle to move the system.

CAUTION

The system weighs approximately 4.6 kg. To avoid possible injury and equipment damage:

- Do not let the system strike walls or door frame.
- Limit movement to a slow careful walk.

Transporting the System

Use extra care when transporting the system using vehicles. In addition to the instructions used when moving the system (See ‘Moving the System’ on *page 3-20 for more information.*), also perform the following:

1. Before transporting, place the system in its special storage case.
2. Ensure that the system is firmly secured while inside the vehicle.
3. Secure system with straps or as directed otherwise to prevent motion during transport.

Attaching the Security Cable

To ensure that the LOGIQ e is not removed from the premises, attach the security cable.

1. Wrap the cable around an imovable object.

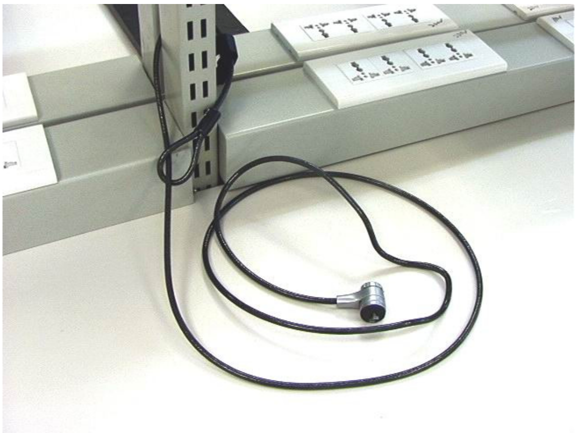


Figure 3-15. Security Cable

2. Make sure and rotate the key to the unlocked position (to the right).
3. Insert the lock into the security slot to the system's side cover.

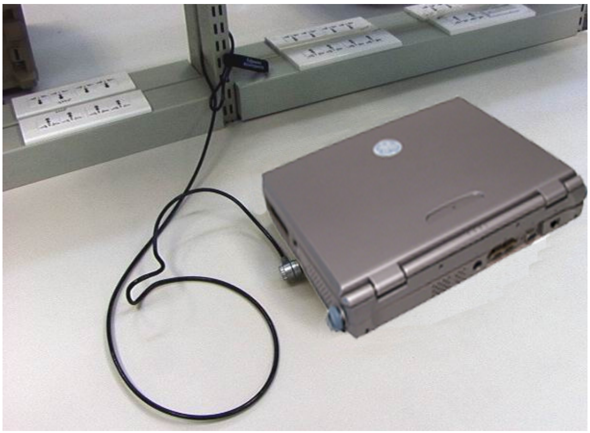


Figure 3-16. LOGIQ e with Security Cable

4. Rotate the key to the locked position (to the left).

Powering the System

Connecting and Using the System

To connect the system to the electrical supply:

1. Ensure that the wall outlet is of the appropriate type.
2. Plug the AC adapter connector on the LOGIQ e.
3. Push the power plug securely into the wall outlet.

CAUTION

Use caution to ensure that the power cable does not disconnect during system use.

If the system is accidentally unplugged, data may be lost.

WARNING

The system should rest on the handle to allow an air gap to prevent overheating.

WARNING

DO NOT use the LOGIQ e on plastic foam, paper or similar type surfaces. The system could overheat and slow down. Ensure that the LOGIQ e is on a sturdy, heat resistant surface.

WARNING

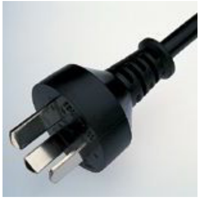
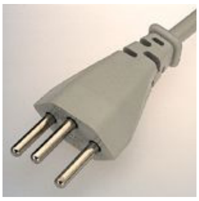
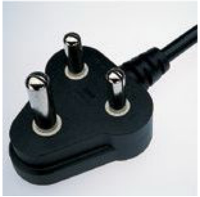
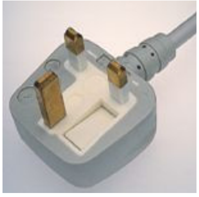
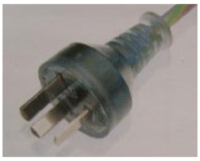
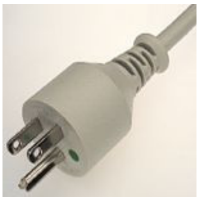
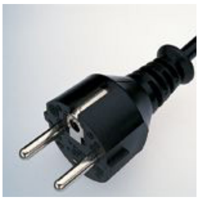
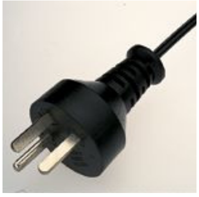
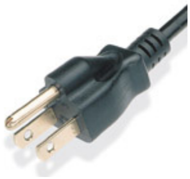
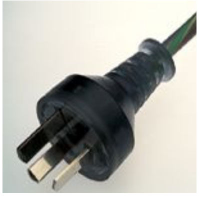
To avoid risk of fire, the system power must be supplied from a separate, properly rated outlet. See ‘Before the system arrives’ on *page 3-3 for more information.*

Under no circumstances should the AC power plug be altered, changed, or adapted to a configuration rated less than specified. Never use an extension cord or adapter plug.

To help assure grounding reliability, connect to a “hospital grade” or “hospital only” grounded power outlet.

Connecting and Using the System (continued)

Table 3-5: Example Plug and Outlet Configurations

AC DC Type	Specification		AC DC Type	Specification
	220-240 VAC, 2.5A (China)			220-240 VAC, 2.5A (Switzerland)
	220-240 VAC, 2.5A (India)			220-240 VAC, 2.5A (U.K.)
	220-240 VAC, 2.5A (Argentina)			100-120 VAC, 2.5A (USA)
	220-240 VAC, 2.5A (Europe)			220-240 VAC, 2.5A (Israel)
	100-120 VAC, 2.5A (Japan)			220-240 VAC, 2.5A (Australia)

Power On

CAUTION

Press the top portion of the ***Power On/Off*** switch to turn the power on.

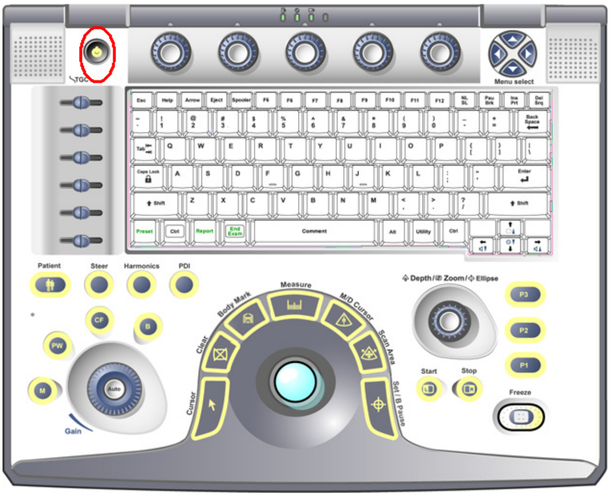

TGC
Menu select
Patient
Steer
Harmonics
PDI
CF
B
PW
M
Auto
Gain
Clear
Body Mark
Measure
M/D Cursor
Scan Area
Cursor
Set / B Pause
Depth / Zoom / Ellipse
P3
P2
P1
Start
Stop
Freeze

Figure 3-17. Power On/Off Switch Location

LED

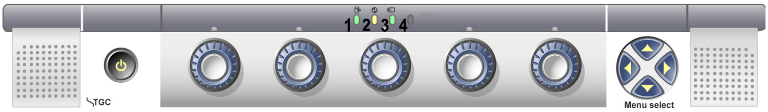


Figure 3-18. LED Indicators

1. Indicates hard disk working status. When the LED is flashing, the system is writing or reading from the hard disk.

   Color: Green
2. Indicates power status. After pressing the Power On/Off switch, the system power is on and this LED is lit.

   Color: Green
3. Indicates battery status. When the battery is charged, the LED is green. When battery power is low, the LED is orange.

   Color: Green and Orange
4. The fourth LED does not work on the LOGIQ e.

Power Up Sequence

The system is initialized. During this time:

- System diagnostics run and start-up status is reflected on the monitor.

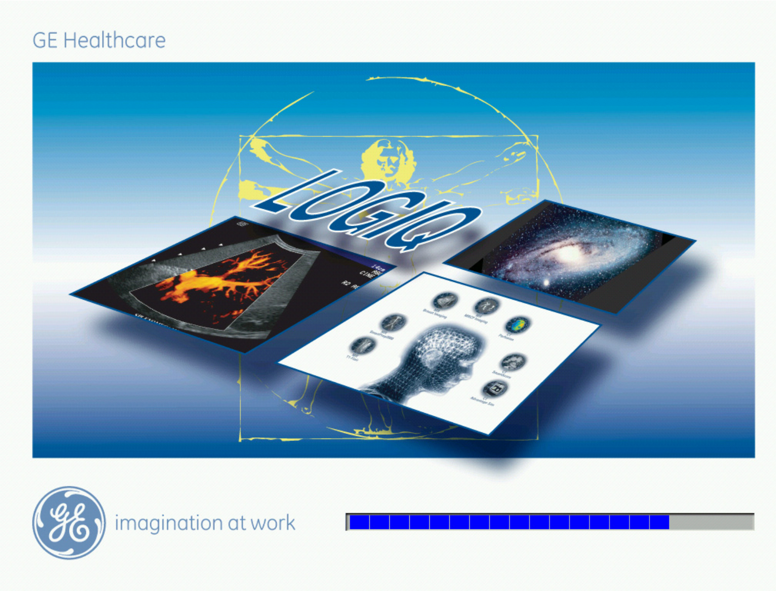


Figure 3-19. Power Up Graphic Sequence

HINTS

If problems occur, freeze the image and take a picture for reference. This will help if there is a need to call for service.

- Probes are initialized for immediate operation.

NOTE: *If no probe is connected, the system goes into freeze mode.*

Power Off

To power off the system:

1. Lightly press the **Power On/Off** switch at the front of the system once. The System-Exit window is displayed.

NOTE: *DO NOT press and hold down the Power On/Off switch to shutdown the system. Instead, lightly press the Power On/Off switch and select Shutdown.*

2. Using the **Trackball**, select Shutdown.

   The shutdown process takes a few seconds and is completed when the second LED turns from green to off.

NOTE: *If the system has not fully shut down in 60 seconds, press and hold down the On/Off switch until the system shuts down.*

3. Disconnect the probes.

   Clean or disinfect all probes as necessary. Store them in their shipping cases to avoid damage.

4. Disconnect AC adapter mains plug from the power outlet.

NOTE: *Disconnect the AC adapter mains plug from the outlet to ensure the system is disconnected from the power source.*

Adjusting the Display Monitor

Rotate the LCD monitor

The LCD monitor position can be adjusted for easy viewing.

- Tilt the LCD monitor for the optimum viewing angle. The maximum angle is 160.

Figure 3-20. LCD Monitor

CAUTION

To avoid damage, DO NOT push the LCD monitor over the maximum opening angle of 160 degrees.

Brightness

Adjusting the LCD monitor's brightness is one of the most important factors for proper image quality.

The proper setup displays a complete gray scale. The lowest level of black should just disappear into the background and the highest white should be bright, but not saturated.

To adjust the brightness/volume:

1. On the alphanumeric keyboard,
   - adjust brightness with the ***Ctrl*** + ***Up/Down*** keys;
   - adjust volume with the ***Ctrl*** + ***Left/Right*** keys

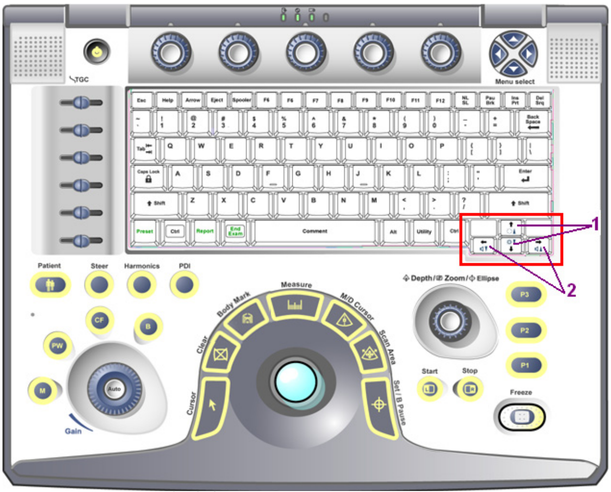

1
2
TGC
Menu select
Patient
Steer
Harmonics
PDI
Measure
Body Mark
M/D Cursor
Scan Area
Clear
Cursor
Set / B Pause
Depth / Zoom / Ellipse
Start
Stop
Freeze
Gain
Auto
CF
B
PW
M
P1
P2
P3
Comment
Preset
Ctrl
Report
Utility

Figure 3-21. Brightness and Volume

1. Brightness
2. Volume

NOTE: After readjusting the LCD monitor's Brightness, readjust all preset and peripheral settings.

NOTE: The brightness of the LCD monitor's Brightness should be set first, as it affects the Gain and Dynamic Range settings of your image. Once set, this should not be changed unless the brightness of your scanning environment changes.

Speakers

Audio is provided by speakers located on the top of the keyboard.

Probes

Introduction

Only use approved probes.

All imaging probes can be connected into the probe port of the LOGIQ e.

Refer to the *Probes* chapter.

Selecting probes

- Always start out with a probe that provides optimum focal depths and penetration for the patient size and exam.
- Begin the scanning session by choosing the correct application and preset for the examination by selecting ***Preset***.
- Begin the scan session using the default Power Output setting for the probe and exam.

Connecting the Probe

Probes can be connected at any time, regardless of whether the console is powered on or off. To ensure that the ports are not active, place the system in the image freeze condition.

To connect a probe:

1. Place the probe's carrying case on a stable surface and open the case.
2. Carefully remove the probe and unwrap the probe cord.
3. DO NOT allow the probe head to hang free. Impact to the probe head could result in irreparable damage. Use the integrated cable management hook to wrap the cord.

   Inspect the probe before and after each use for damage or degradation to the housing, strain relief, lens, seal and connector. DO NOT use a transducer which appears damaged until functional and safe performance is verified. A thorough inspection should be conducted during the cleaning process.
4. Align the connector with the probe port and carefully push into place with the cable facing the front of the system.
5. Press the connector locking lever up.
6. Carefully position the probe cord so it is free to move and is not resting on the floor.
7. When the probe is connected, it is automatically activated.

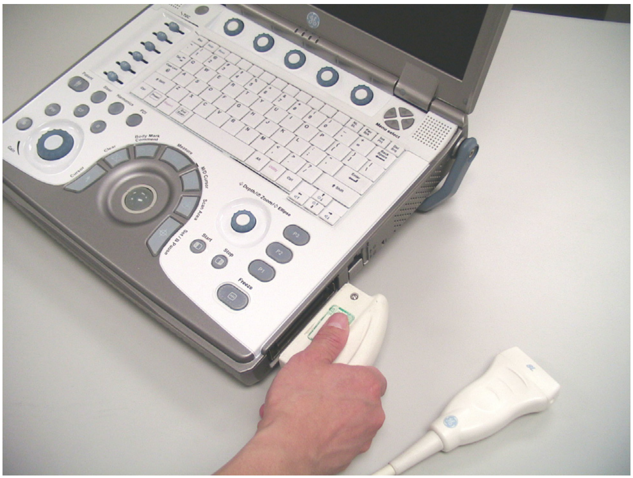


Figure 3-22. Probe connection to LOGIQ e

Connecting the Probe (continued)

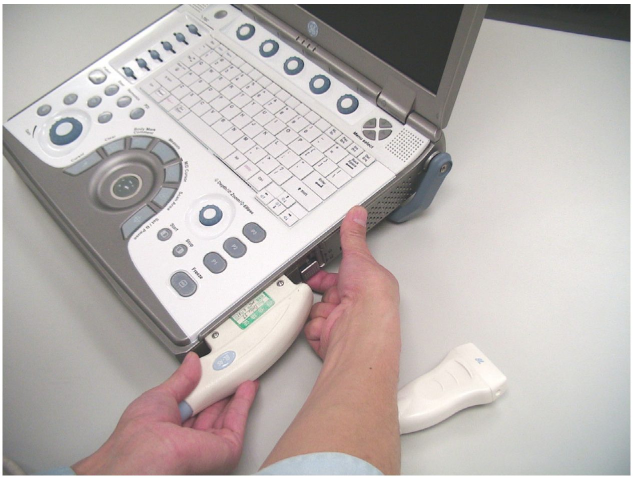


Figure 3-23. Probe connector locking handle

CAUTION

Fault conditions can result in electric shock hazard. Do not touch the surface of probe connectors which are exposed when the probe is removed. Do not touch the patient when connecting or disconnecting a probe.

Cable Handling

Take the following precautions with probe cables:

- Do not bend the cable acutely

Deactivating the Probe

When deactivating the probe, the probe is automatically placed in standby mode.

To deactivate a probe:

1. Ensure the LOGIQ e is in freeze mode. If necessary, press the ***Freeze*** key.
2. Gently wipe the excess gel from the face of the probe.
3. Carefully slide the probe around the right side of the keyboard, toward the probe holder. Ensure that the probe is placed gently in the probe holder.

Disconnecting the Probe

Probes can be disconnected at any time. However, the probe should not be active when disconnecting the probe.

- Press the connector locking lever down.
- Pull the probe and connector straight out of the probe port.
- Carefully slide the probe and connector away from the probe port and around the right side of the keyboard.
- Ensure the cable is free.
- Be sure that the probe head is clean before placing the probe in its storage box or a wall hanging unit.

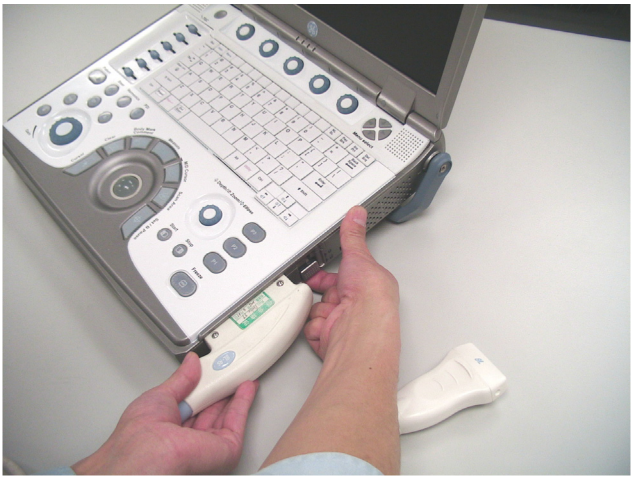


Figure 3-24. Probe connector locking handle

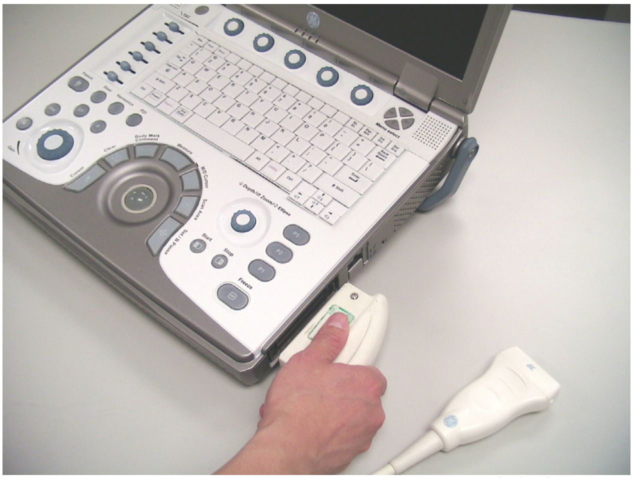


Figure 3-25. Probe connection to LOGIQ e

Transporting Probes

When transporting a probe a long distance, store it in its carrying case.

Storing the Probe

It is recommended that all probes be stored in the provided carrying case or in the wall rack designed for probe storage.

- First place the probe connector into the carrying case.
- Carefully wind the cable into the carrying case.
- Carefully place the probe head into the carrying case. DO NOT use excessive force or impact the probe head.

Operator Controls

Control Panel Map

Controls are grouped together by function for ease of use. See the callouts for this figure on the following page.

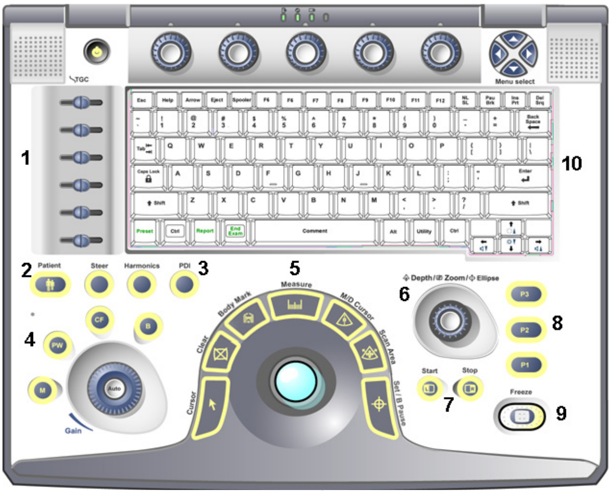

TGC
Menu select
1
10
2
Patient
Steer
Harmonics
PDI
3
5
Measure
Body Mark
M/D Cursor
Scan Area
Clear
Cursor
Set / B Pause
Depth/Zoom/Ellipse
6
P3
P2
P1
8
4
CF
B
PW
M
Auto
Gain
Start
Stop
7
Freeze
9
Preset
Report
End Exam
Comment
Utility

Figure 3-26. Control Panel

1. Time Gain Compensation (TGC)
2. New Patient
3. Additional Feature Keys
4. Mode/Gain/Auto keys: M-Mode, Pulsed Wave Doppler (PW) Modes, Color Flow (CF) Mode and B-Mode
5. Imaging/Measurement Keys: Cursor, Clear, Bodymark, Measure, M/D Cursor, Scan Area, Set/B Pause
6. Depth/Zoom/Ellipse
7. Start/Stop
8. Programmable Print Keys
9. Freeze
10. Keyboard

Keyboard

The standard alpha-numeric keyboard has some special functions.

Esc	Exit current display screen.
Help (F1 Key)	Enter Online help / user manual.
Arrow (F2 Key)	Annotation arrow.
Eject (F3 Key)	Eject media.
Spooler (F4 Key)	Activates DICOM Job Spooler screen.
Reverse (F5 Key)	Reverse.
User Defined Keys (F6 through F12 Keys)	The following functions are available for the F6-F12 keys: CWD, 3D, LOGIQ View, Compound, ECG On/Off, Set Home and Text Overlay.
Utility	Enter the Utility function and configure the system.
Preset	Preset the system.
Report	Enter the worksheet page.

Top/Sub Menu

The Top/Sub Menu contains exam function and mode/function specific controls.

NOTE: Different menus are displayed depending on which Top/Sub Menu is selected.

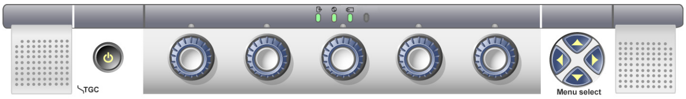


Figure 3-27. Top/Sub Menu Controls

The Top/Sub Menu contains adjustable knobs associated with it. The functionality of these controls change, depending upon the currently displayed menu.

Mode, Display and Record

This group of controls provides various functions relating to the display mode, display orientation, image recording/saving, freeze, gain and Cine scroll.

The Mode Controls select the desired display mode or combinations of display modes.

- During dual display modes the **L** and **R** keys activate the Left or Right displayed image.
- B Pause freezes the B-Mode image while keeping the Doppler spectrum display active.
- Auto is used to:
    - initiate auto optimize
    - turn off the auto mode.
- Depth controls the image display depth.
- The Reverse key toggles the left/right orientation of the scan image.
- Record keys are used to activate/print the designated recording device (e.g. video page printer, multi-image camera, image archive option).
- The Freeze key is used to stop the acquisition of ultrasound data and freeze the image in system memory. Pressing ***Freeze*** a second time continues live image data acquisition.
- To activate a specific mode, press the appropriate mode key.

  Each mode has its own gain control via the larger gray knob surrounding the mode key.
- P1 key saves the image to hard disk (factory default setting).
- P2 key prints the image (factory default setting).
- P3 key saves images directly to the USB Flash Drive (factory default setting).

NOTE: *The function of the P1, P2 and P3 keys can be user defined.*

Measurement and Annotation

This group of controls performs various functions related to making measurements, annotating and adjusting the image information.

- Pressing the Comment key once enables the image text editor and displays the annotation library Top/Sub Menu; pressing the Comment key twice enables the Body Pattern Top/Sub Menu and displays the default pattern on the screen.

  The clear key is used to clear the body pattern.
- The Clear key is generally used to erase functions, such as annotations/comments and measurements. Pressing the Clear key again exits the selected function. The Clear key also can quickly exit the Sub Menu.
- When the Depth/Zoom/Ellipse control is adjusted, it activates the ellipse measurement function after the first distance measurement has been set and the second caliper is activated.

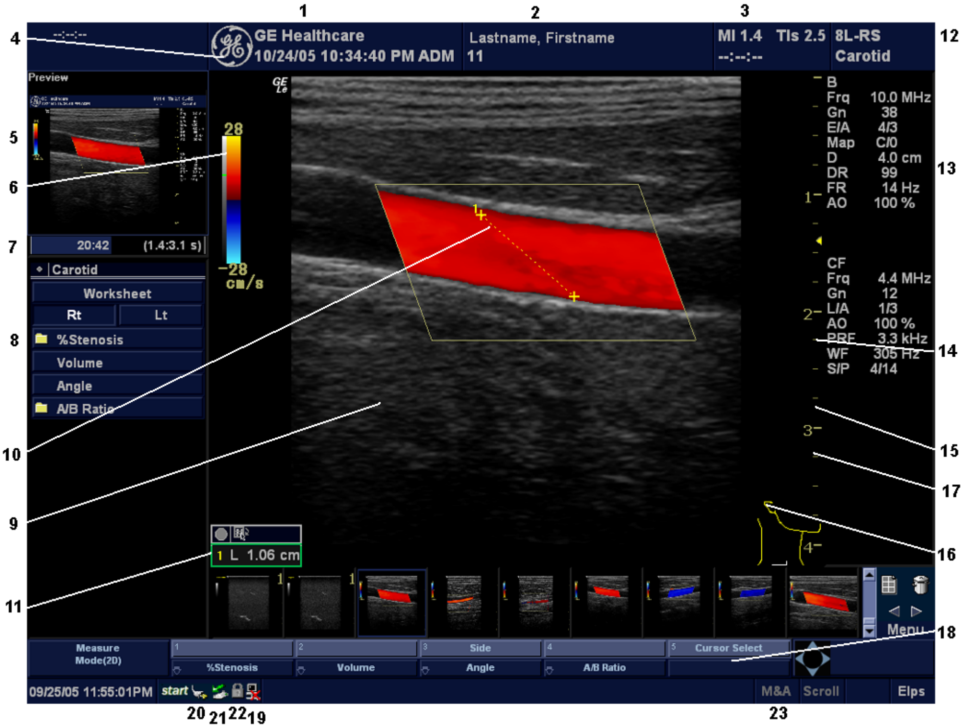
  Press Set to fix the measurement after the ellipse adjustment is complete. The measurement is then displayed in the measurement result window.
- The Measure key is used in all types of basic measurements. It also becomes the “mouse” arrow for making selections along with the Set key (to fix or finish a selection). When the Measure key is pressed, the measurement Top/Sub Menu is displayed.

Measurement and Annotation (continued)

- The M/D Cursor key enables Trackball control of the M-Mode or Doppler cursor line (not angle correction) or the CFM window in real-time Color Flow Mode.
- The Scan Area key enables Trackball control of the B-Mode image area size and position in B/W, the CFM window size and position in Color mode and the position in Zoom.
- The Set key is used for various functions, but is generally used to fix or finish an operation (e.g. to fix a measurement caliper).
- The Trackball is used with almost every key function in this group. Trackball control depends on the last key function pressed.

Monitor Display

Monitor Display



GE Healthcare
10/24/05 10:34:40 PM ADM
Lastname, Firstname
11
MI 1.4 TIs 2.5 8L-RS
Carotid

B
Frq 10.0 MHz
Gn 38
E/A 4/3
Map C/0
D 4.0 cm
DR 99
FR 14 Hz
AO 100 %

CF
Frq 4.4 MHz
Gn 12
L/A 1/3
AO 100 %
PRF 3.3 kHz
WF 305 Hz
S/P 4/14

1 L 1.06 cm

09/25/05 11:55:01PM

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
--:--:--
Preview
28
-28
cm/s
20:42
(1.4:3.1 s)
Carotid
Worksheet
Rt
Lt
%Stenosis
Volume
Angle
A/B Ratio
--:--:--
1
2
3
4
Measure Mode(2D)
%Stenosis
Volume
Side
Angle
A/B Ratio
Cursor Select
Menu
start
M&A
Scroll
Elps

Figure 3-28. Monitor Display Tour

1. Institution/Hospital Name, Date, Time, Operator Identification.
2. Patient Name, Patient Identification.
3. Power Output Readout
4. GE Symbol: Probe Orientation Marker.
5. Image Preview.
6. Gray/Color Bar.
7. Cine Gauge.
8. Measurement Summary Window.
9. Image.
10. Measurement Calipers.
11. Measurement Results Window.
12. Probe Identifier. Exam Preset.
13. Imaging Parameters by Mode.
14. Focal Zone Indicator.
15. TGC.
16. Body Pattern.
17. Depth Scale.
18. SoftMenu
19. Caps Lock (On or Off)
20. Start Menu Icon
21. Battery Icon
22. Card Icon
23. Trackball Functionality Status: Scroll, M&A (Measurement and Analysis), Position, Size, Scan Area Width and Tilt

Chapter 4

Preparing for an Exam

Describes how to begin an exam.

Beginning an Exam

Introduction

Begin an exam by entering new patient information.

The operator should enter as much information as possible, such as:

1. Dataflow
2. Exam category
3. Patient ID
4. Patient name
5. Exam Information

The patient's name and ID number is retained with each patient's image and transferred with each image during archiving or hard copy printing.

CAUTION

To avoid patient identification errors, always verify the identification with the patient. Make sure the correct patient identification appears on all screens and hard copy prints.

Beginning a New Patient

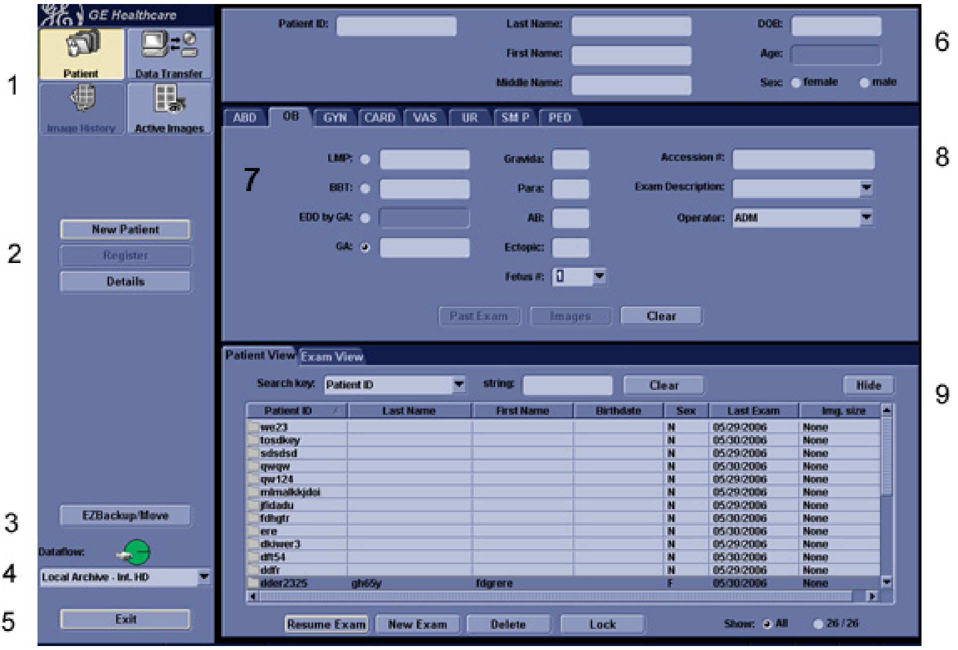
Pressing the **Patient** key on the keyboard displays the Patient screen on the monitor.

New Patient should be selected at the beginning of each new patient exam. End Exam should be pressed at the end of each exam. Pressing **New Patient** automatically stores all patient data, annotations, measurements, calculations and worksheets of the last exam. Images are not automatically stored. A warning message appears regarding images being erased or saved. It is always best to select “Select All” if you are unsure of saving. Exams and patients can always be erased later.

NOTE: *If the current patient does not exist, selecting **Patient View** activates the Patient Search screen.*

NOTE: *If the current patient exists, selecting **Exam View** activates the Exam History screen.*

Patient Screen


1
2
3
4
5
6
7
8
9
GE Healthcare
Patient
Data Transfer
Image History
Active Images
New Patient
Register
Details
EZBackup/Move
Dataflow:
Exit
Patient ID:
Last Name:
First Name:
Middle Name:
DOB:
Age:
Sex: female male
ABD
OB
GYN
CARD
VAS
UR
SM P
PED
LMP:
BBT:
EDD by GA:
GA:
Gravida:
Para:
AB:
Ectopic:
Accession #:
Exam Description:
Past Exam
Images
Clear
Patient View
Exam View
string:
Clear
Hide
Resume Exam
New Exam
Delete
Lock
Show: All
26 / 26

Dataflow: Local Archive - Int. HD

Fetus #: 1

Operator: ADM

Search key: Patient ID

Patient ID	Last Name	First Name	Birthdate	Sex	Last Exam	Img. size
we23				N	05/29/2006	None
tosdkey				N	05/30/2006	None
sdsdsd				N	05/29/2006	None
qwqw				N	05/30/2006	None
qw124				N	05/29/2006	None
mlmalkkjdoi				N	05/29/2006	None
jfidadu				N	05/29/2006	None
fdhgtr				N	05/30/2006	None
ere				N	05/30/2006	None
dkiwer3				N	05/29/2006	None
dft54				N	05/30/2006	None
ddfr				N	05/29/2006	None
dder2325	gh65y	fdgrere		F	05/30/2006	None

Figure 4-1. Patient Screen (Example: Category OB)

1. Image Management
2. Function Selection
3. EZBackup/Move
4. Dataflow Selection
5. Exit
6. Patient Information
7. Category Selection
8. Exam Information
9. Patient View

Patient Screen (continued)

Enter Patient Data with the alphanumeric keyboard.

To navigate through the Patient Entry menu, use the ***Tab*** key or **Trackball** and **Set** to move and fix the cursor.

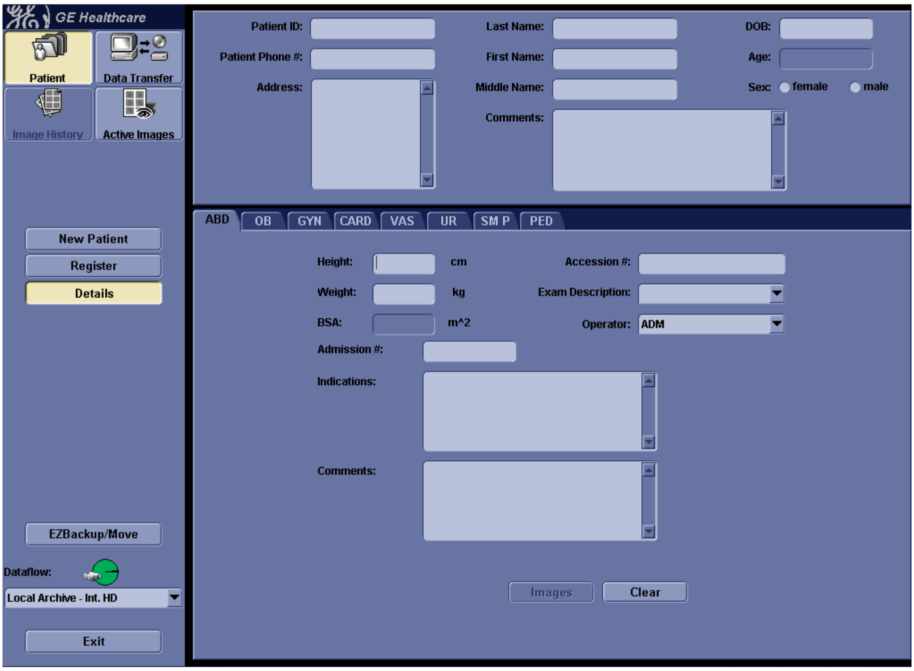
The Patient Screen details are:

1. Image Management
   - Patient–Provides a search and creation of patient. (currently selected)
   - Image History–Provides a list of images per exam for the currently selected patient.
   - Active Images–Provides preview of the currently selected exam.
   - Data Transfer–Provides an interface to handle patient data from a remote device.
2. Function Selection
   - New Patient–Used to clear patient entry screen in order to input a new patient's data into the database.
   - Register–Used to enter new patient information into the database prior to the exam.

NOTE: *If you are using the auto-generate Patient ID feature, do not select Register.*

Patient Screen (continued)

- Details–Select the Detail box to activate/deactivate the exam details. Exam details include Indications, Comments, Admission Number and Exam Description.


GE Healthcare
Patient
Data Transfer
Image History
Active Images
New Patient
Register
Details
EZBackup/Move
Exit
Patient ID:
Patient Phone #:
Address:
Last Name:
First Name:
Middle Name:
Comments:
DOB:
Age:
Sex:
○ female
○ male
ABD
OB
GYN
CARD
VAS
UR
SM P
PED
Height:
cm
Weight:
kg
BSA:
m^2
Admission #:
Indications:
Comments:
Accession #:
Exam Description:
Images
Clear

Operator: ADM

Dataflow: Local Archive - Int. HD

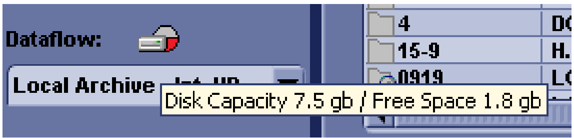
Figure 4-2. Detail Window

3. EZBackup/Move–One-step method to backup (move and delete patient images) to an external media. See Chapter 16 for more details.

Patient Screen (continued)

4. Dataflow Selection–Select the appropriate dataflow.

   If you place the cursor on the icon, the pop-up menu displays disk capacity.



Disk Capacity 7.5 gb / Free Space 1.8 gb

Figure 4-3. Dataflow Pop-up

WARNING

Ensure you have selected a dataflow. If No Archive is selected, no patient data is saved. A Ø appears next to Dataflow if No Archive is selected.

5. Exit–Used to exit Patient Menu.
6. Patient Information
   - Patient ID Number
   - Patient Name–Last, First and Middle
   - DOB (Birthdate)
   - Age (automatically calculated when birthdate is input)
   - Sex
7. Category Selection

   Select from 8 exam application categories: Abdomen, Obstetrics, Gynecology, Cardiology, Vascular, Urology, Small Parts or Pediatrics.

   When a category is selected, the measurement and category presets are displayed.

Patient Screen (continued)

8. Exam Information

   Shows the Current/Active Exam information. Information pertinent to the selected exam category appears in the window. All possible information needs to be entered.

   - Images–Displays the selected exam's images.

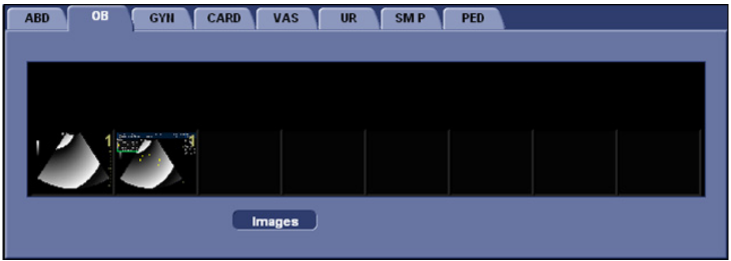
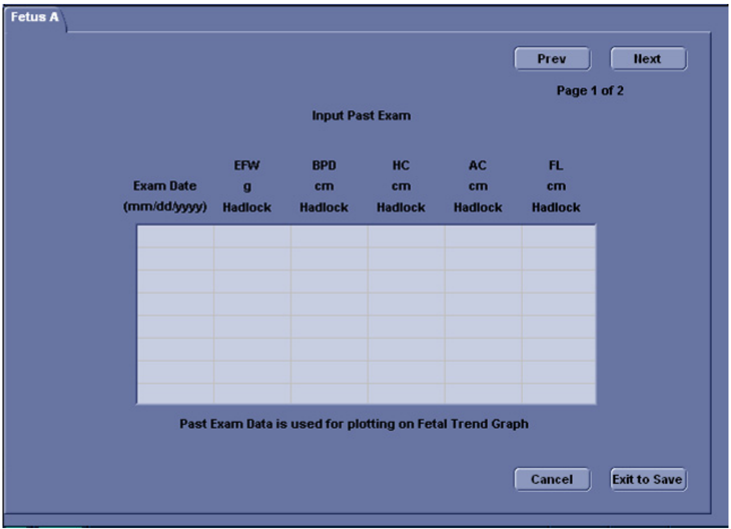

ABD
OB
GYN
CARD
VAS
UR
SM P
PED
Images

Figure 4-4. Images

- Clear–Clears existing data.
- Past Exam (only for OB)–Input past exam data (register the patient before using).


Fetus A
Prev
Next
Page 1 of 2
Input Past Exam
Exam Date (mm/dd/yyyy)
EFW g Hadlock
BPD cm Hadlock
HC cm Hadlock
AC cm Hadlock
FL cm Hadlock
Cancel
Exit to Save

Past Exam Data is used for plotting on Fetal Trend Graph

Figure 4-5. Input Past Exam

Patient Screen (continued)

9. Patient View–Lists the patients in the database.

   - Search key–select search item from Patient ID, Last Name, First Name, Birthdate, Sex, Exam Date, Exam Today, Accesstion Number, Exam Description, Exam Date Before, Exam Date Between, Exam Date After.

   NOTE: If "Exam Date Between" is selected, the Input Dialog displays and you can select the date from the displayed calender.

   - String–enter appropriate information.

   NOTE: If "Exam Date Between" is used for the Search key, the From and To dates are separated by a "-" (dash) in the Search String.

   - Clear–Clears the entered string.
   - Show All–Displays all patients in the database.
   - Show XX/XX–Displays the searched (selected) patients (number of patients currently displayed on the list/ number of patients in the database).
   - Review–Select Patient/Exam for review.
   - Resume Exam–Continues the exam for that patient if you select the last exam of the day.

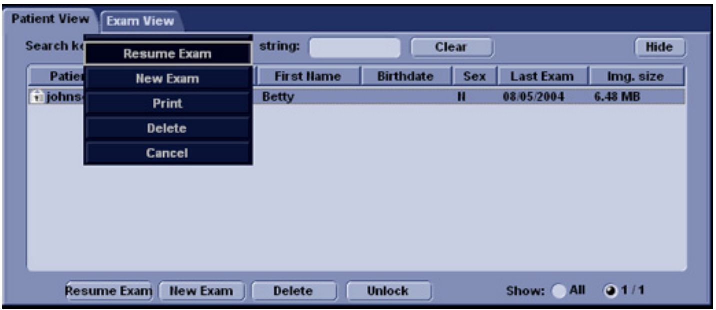

Patient View
Exam View
Search k
string:
Clear
Hide
Resume Exam
New Exam
Print
Delete
Cancel
Patie
First Name
Birthdate
Sex
Last Exam
Img. size
johns
Betty
M
08/05/2004
6.48 MB
Resume Exam
New Exam
Delete
Unlock
Show:
All
1 / 1

Figure 4-6. Patient List with Resume Exam

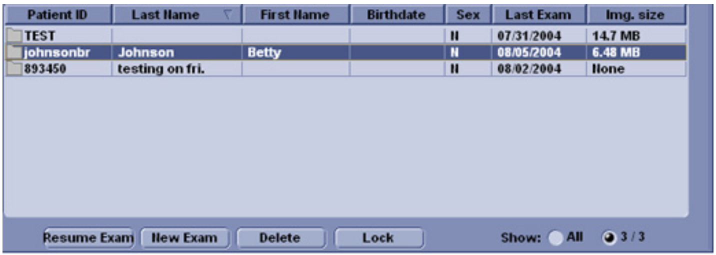
Patient Screen (continued)

- New Exam–Creates a new exam on a current patient.
- Delete–Deletes Patient/Exam.

NOTE: *“Delete” is only displayed when you login as Administrator.*

- Hide–Hides the Patient List Section.
- Lock/Unlock–Locks the exam/patient. Prevents move and delete functions.

To lock, select the exam or patient to be locked and select ***Lock***.

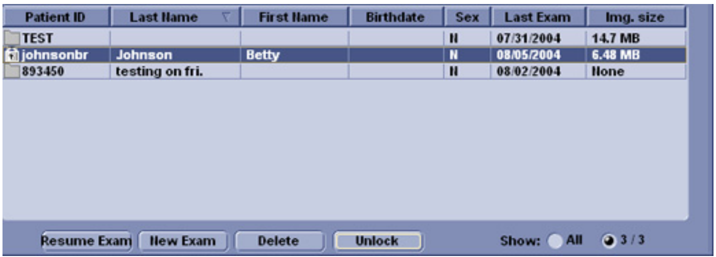


Patient ID	Last Name	First Name	Birthdate	Sex	Last Exam	Img. size
TEST				N	07/31/2004	14.7 MB
johnsonbr	Johnson	Betty		N	08/05/2004	6.48 MB
893450	testing on fri.			N	08/02/2004	None

Figure 4-7. Lock the exam

If you select the patient, all exams are locked. If you select one exam, the selected exam is locked and the lock icon displays in the patient ID cell.

To unlock, select the locked exam or patient and select ***Unlock***.



Patient ID	Last Name	First Name	Birthdate	Sex	Last Exam	Img. size
TEST				N	07/31/2004	14.7 MB
johnsonbr	Johnson	Betty		N	08/05/2004	6.48 MB
893450	testing on fri.			N	08/02/2004	None

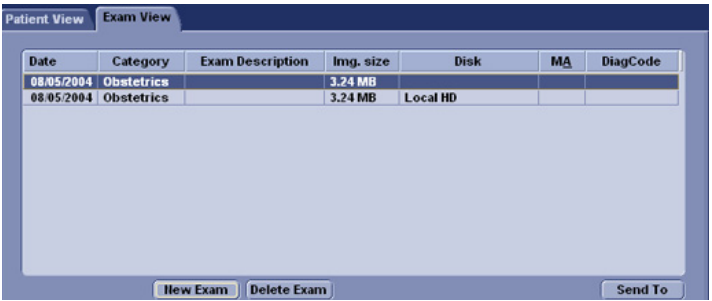
Figure 4-8. Unlock the exam

Patient Screen (continued)

Exam View–Displays the Exam History of the selected patient.

- Disk - Displays the disk name on which you saved the exam’s image data. If “+” displays behind the disk name, the data is saved on two or more disks.

See ‘Reviewing the Image’ on *page 4-20 for more information.*



Date	Category	Exam Description	Img. size	Disk	MA	DiagCode
08/05/2004	Obstetrics		3.24 MB			
08/05/2004	Obstetrics		3.24 MB	Local HD		

Figure 4-9. Exam View

CAUTION

To avoid patient identification errors, always verify the identification with the patient. Make sure the correct patient identification appears on all screens and hard copy prints.

Patient Screen (continued)

CAUTION

To maintain optimum performance and to safeguard patient data, keep the total number of patients in the database below 1,000.

To reduce the total number of patients in the database, perform the following procedure.

1. Before starting EZBackup, select “Unlock All” on the Utility -> Admin -> Logon screen.

   Prepare the unformatted CD-R or DVD-R before EZBackup.

NOTE: Formatted CD-R or DVD-R cannot be used for EZBackup.

2. Backup all patient data by EZBackup. Before beginning EZBackup, set the “Backup Files Older Than in Days” to “0” on the Utility -> System -> Backup/Restore -> Backup/Move screen to backup all data.

   Deselect (uncheck) “Move Files after Backup”.
3. Go to the patient screen, select the patients/exams to delete so the remaining number is less than 1,000. Select “Delete” to delete the selected data.

NOTE: Removing image data with the “Move” function does not reduce the patient number in the database.

Scanning a New Patient

When starting a new patient's exam, ensure you do the following:

1. Press **Patient**.
2. Press ***New Patient*** on the Patient menu.
3. If there are images on the clipboard, a pop-up menu appears. Specify whether you want to store images permanently, delete images, or go to active images.
4. Choose the exam category.
5. Verify the dataflow.

NOTE: *DO NOT use the removable media Data Flows on the New Patient menu.*

6. Fill in patient information.

NOTE: *You can also select a patient from the patient database at the bottom of the Patient menu if the patient has a patient ID.*

Columns drive the ordering of the patients displayed. The column that you select drives the order of the displayed patient database.

7. Select ***Register***. Enter Past OB Exam information, if desired.
8. Select the probe from the Top/Sub Menu to start scanning (or select Exit, Esc, Scan, or Freeze).
9. Perform the exam.

Scanning a New Patient (continued)

10. Store the raw data to the clipboard.

    To store the still image, press **Freeze** and run the cineloop using the **Trackball**. Select the frame and press **P1** (or the assigned Printer key).

    To store the cineloop, press **Freeze** and run the cineloop using the **Trackball**. Select the start/end frame and run the selected loop. Press **P1** (or the assigned Print key).
11. When you have completed the study, press ***End Exam***. The image management screen displays. Select the images (still frame or cineloop) you want to store or select ***Select All*** to store all images. Select ***Permanent Store*** to store the images permanently.

Entering a Patient List

All patient information can be entered before starting an exam.

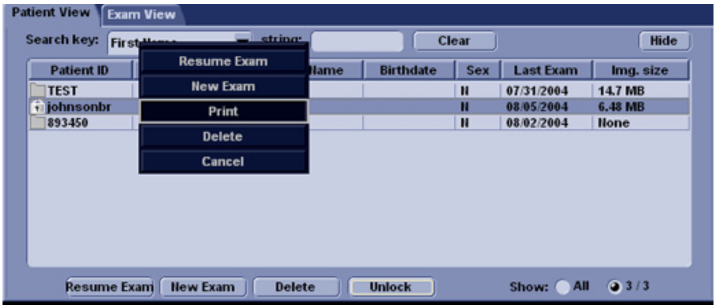
1. Press **Patient** to display Patient Screen.
2. Press ***New Patient*** to erase the current patient data.
3. Enter the Patient ID.
4. Enter the patient and exam information.
5. Press ***Register***.
6. Repeat above steps as required.

Select the patient from the Patient List and select ***Resume Exam*** to start an exam.

Patient List Printout

You can print the patient list on a connected printer.

1. Move the cursor to the patient list and select any patient.
2. Press the left **Set** key. The pop-up menu displays.


Patient View
Exam View
Search key:
First
string:
Clear
Hide
Resume Exam
New Exam
Print
Delete
Cancel
Resume Exam
New Exam
Delete
Unlock
Show:
○ All
● 3 / 3

Patient ID	Name	Birthdate	Sex	Last Exam	Img. size
TEST			N	07/31/2004	14.7 MB
johnsonbr			N	08/05/2004	6.48 MB
893450			N	08/02/2004	None

Figure 4-10. Print the patient list

3. Select ***Print*** and press **Set**.

Starting a new exam on an existing patient

1. Press **Patient**.
2. Select the patient from the Patient List.
3. Select ***New Exam***.
4. A new exam is created. Enter the data and begin the scan.

Scanning without entering any patient data

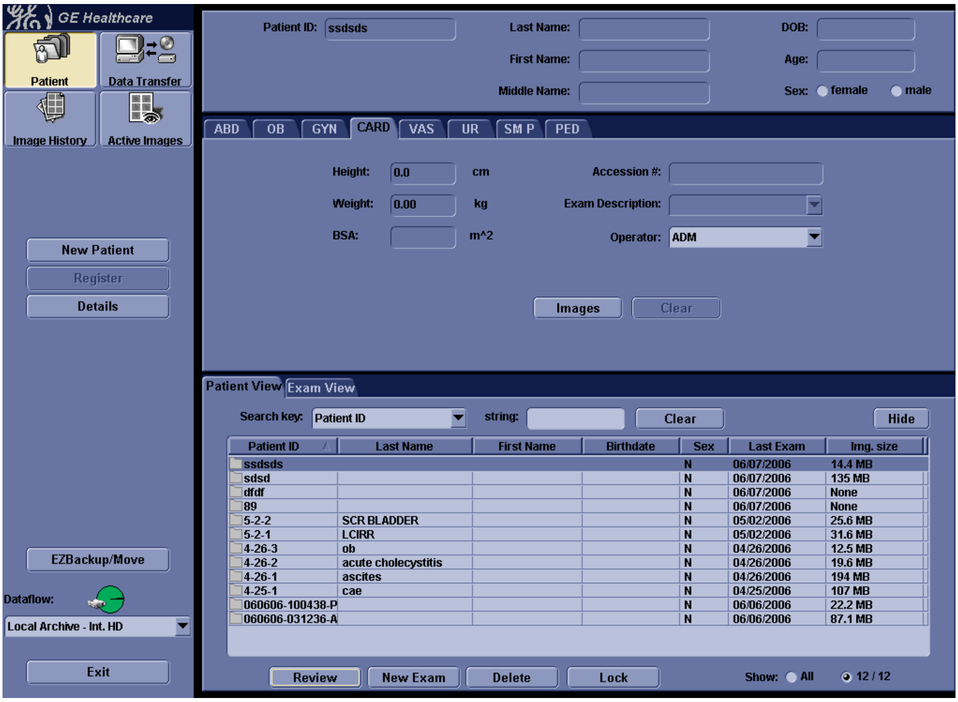
To scan a patient without entering any patient data until the end of the exam:

1. Press ***Scan***.
2. Scan the patient and save images to clipboard without patient. You receive a warning that states “A patient must be selected for permanent storage of image.” Press OK.
3. Press **Patient** to display the Patient Search screen.
4. Enter the Patient ID.
5. Enter patient data and exam information as necessary.
6. Press ***Active Images***.
7. Press ***Permanent Store***.

Retrieving and editing archived information

Searching for an existing patient

1. Press ***Patient*** to display the Patient Screen. The Patient Search Screen is displayed.


GE Healthcare
Patient
Data Transfer
Image History
Active Images
New Patient
Register
Details
EZBackup/Move
Exit
ABD
OB
GYN
CARD
VAS
UR
SM P
PED
Images
Clear
Patient View
Exam View
Clear
Hide
Review
New Exam
Delete
Lock

Patient ID: ssdsds
Last Name:
First Name:
Middle Name:
DOB:
Age:
Sex: ○ female ○ male
Height: 0.0 cm
Weight: 0.00 kg
BSA: m^2
Accession #:
Exam Description:
Operator: ADM
Dataflow: Local Archive - Int. HD
Search key: Patient ID
string:

Patient ID	Last Name	First Name	Birthdate	Sex	Last Exam	Img. size
ssdsds				N	06/07/2006	14.4 MB
sdsd				N	06/07/2006	135 MB
dfdf				N	06/07/2006	None
89				N	06/07/2006	None
5-2-2	SCR BLADDER			N	05/02/2006	25.6 MB
5-2-1	LCIRR			N	05/02/2006	31.6 MB
4-26-3	ob			N	04/26/2006	12.5 MB
4-26-2	acute cholecystitis			N	04/26/2006	19.6 MB
4-26-1	ascites			N	04/26/2006	194 MB
4-25-1	cae			N	04/25/2006	107 MB
060606-100438-P				N	06/06/2006	22.2 MB
060606-031236-A				N	06/06/2006	87.1 MB

Show: ○ All ● 12 / 12

Figure 4-11. Patient Search Screen

2. Select the search key. Enter the search string.

NOTE: *When the number of patients on a hard disk is in the hundreds, it takes time to search for a patient or switch to another screen. In this case, do one of the following:*

- *Uncheck the Auto Search function at the Utility -> Miscellaneous screen.*
- *Do not use “Show All”.*
- *Delete unnecessary patient data.*

Searching for an existing patient (continued)

3. An appropriate patient is displayed in the patient list.

   Select ***Review*** to review the exam history of this patient.

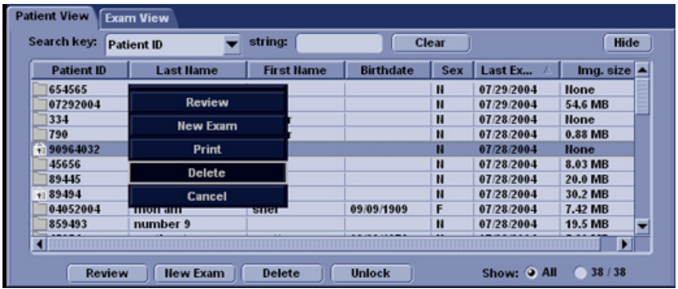
   Select ***New Exam*** to create a new exam for this patient.

NOTE: *The preset "Double click on patient list to start", located on the Utility -> Connectivity -> Miscellaneous screen, allows you to display either the Review or New Exam screen by double clicking the* ***Set*** *key on the patient name.*

Select ***Delete*** to delete this patient.

NOTE: *"Delete" is only displayed when you login as Administrator.*

NOTE: *If you select the patient and press the left* ***Set*** *key, the pop-up menu displays.*


Patient View
Exam View
Clear
Hide
Review
New Exam
Print
Delete
Cancel
Review
New Exam
Delete
Unlock
Show:
All
38 / 38

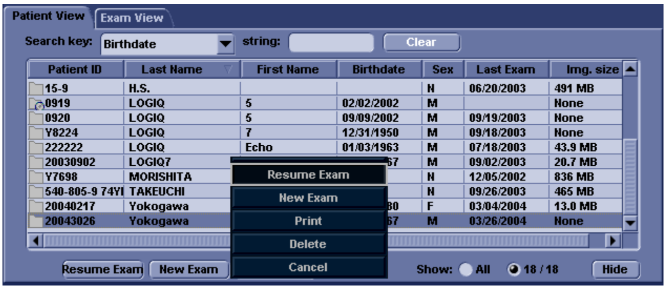
Search key: Patient ID

string:

Patient ID	Last Name	First Name	Birthdate	Sex	Last Ex...	Img. size
654565				N	07/29/2004	None
07292004				N	07/29/2004	54.6 MB
334				N	07/28/2004	None
790				N	07/28/2004	0.88 MB
90964032				N	07/28/2004	None
45656				N	07/28/2004	8.03 MB
89445				N	07/28/2004	20.0 MB
89494				N	07/28/2004	30.2 MB
04052004	mon am	sher	09/09/1909	F	07/28/2004	7.42 MB
859493	number 9			N	07/28/2004	19.5 MB

Figure 4-12. Archived Patient

If you select the patient of the day, ***Resume Exam*** displays to continue the exam.


Patient View
Exam View
Clear
Resume Exam
New Exam
Print
Delete
Cancel
Resume Exam
New Exam
Show:
All
18 / 18
Hide

Search key: Birthdate

string:

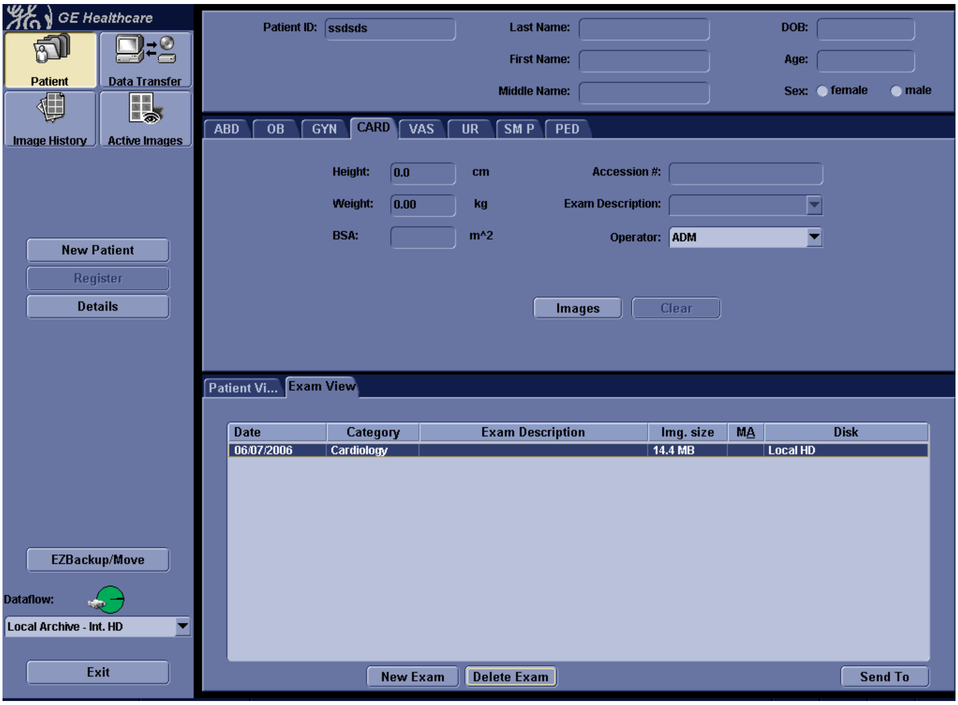
Patient ID	Last Name	First Name	Birthdate	Sex	Last Exam	Img. size
15-9	H.S.			N	06/20/2003	491 MB
0919	LOGIQ	5	02/02/2002	M		None
0920	LOGIQ	5	09/09/2002	M	09/19/2003	None
Y8224	LOGIQ	7	12/31/1950	M	09/18/2003	None
222222	LOGIQ	Echo	01/03/1963	M	07/18/2003	43.9 MB
20030902	LOGIQ7		67	M	09/02/2003	20.7 MB
Y7698	MORISHITA			N	12/05/2002	836 MB
540-805-9 74YI	TAKEUCHI			N	09/26/2003	465 MB
20040217	Yokogawa		80	F	03/04/2004	13.0 MB
20043026	Yokogawa		67	M	03/26/2004	None

Figure 4-13. Patient of the Day

Reviewing the patient exam

To review the patient exam,

1. Search the patient by using Patient Search Field.
2. Move the cursor to the patient and press **Set**.
3. Select ***Review*** or the Exam View tab.
4. The Patient Exam screen displays.


GE Healthcare
Patient
Data Transfer
Image History
Active Images
New Patient
Register
Details
EZBackup/Move
Exit
Last Name:
First Name:
Middle Name:
DOB:
Age:
Sex: ○ female ○ male
ABD
OB
GYN
CARD
VAS
UR
SM P
PED
Accession #:
Exam Description:
Images
Clear
Patient Vi...
Exam View
New Exam
Delete Exam
Send To

Patient ID: ssdsds

Height: 0.0 cm

Weight: 0.00 kg

BSA: m^2

Operator: ADM

Dataflow: Local Archive - Int. HD

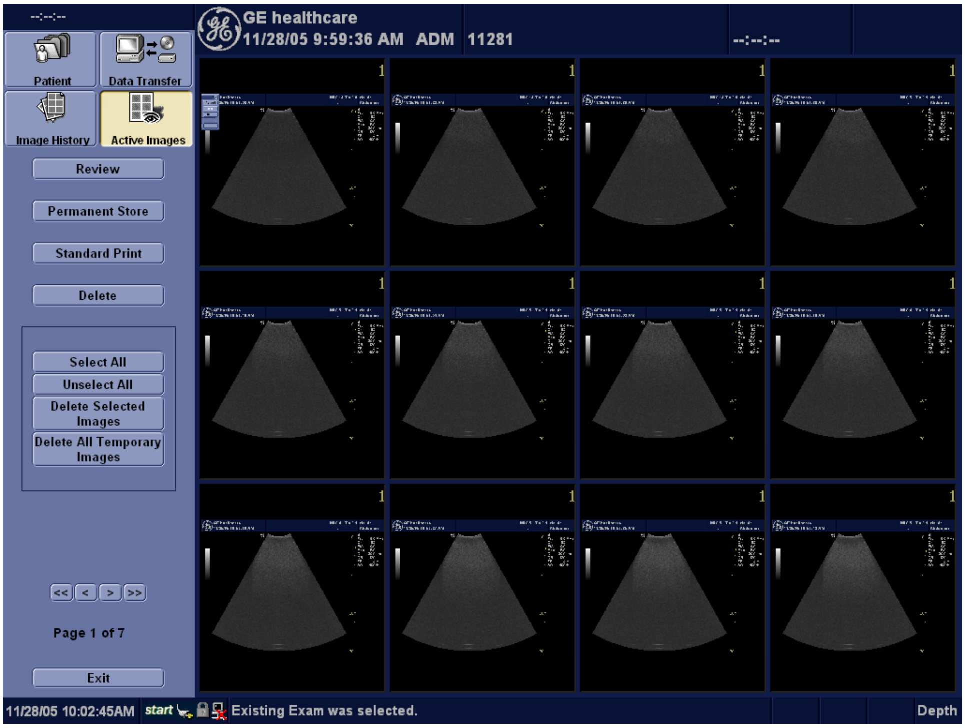
Date	Category	Exam Description	Img. size	MA	Disk
06/07/2006	Cardiology		14.4 MB		Local HD

Figure 4-14. Patient Exam Screen

5. The exam list displays in the Exam History field.

Reviewing the Image

1. Select the exam which includes the image to review.
2. Select ***Active Images***.
3. Select the image and press ***Review*** or double click on the image. The image is displayed.


--:--:--
GE healthcare
11/28/05 9:59:36 AM
ADM
11281
--:--:--
Patient
Data Transfer
Image History
Active Images
Review
Permanent Store
Standard Print
Delete
Select All
Unselect All
Delete Selected Images
Delete All Temporary Images
<<
<
>
>>
Page 1 of 7
Exit
11/28/05 10:02:45AM
start
Depth

Existing Exam was selected.

Figure 4-15. Active Images Screen

Reviewing the Image (continued)

Another method to review the image:

1. Select the patient.
2. Select ***Image History***.
3. Select the appropriate button which shows the old exam by date and storage location. 'Active Exam' is displayed on the button.

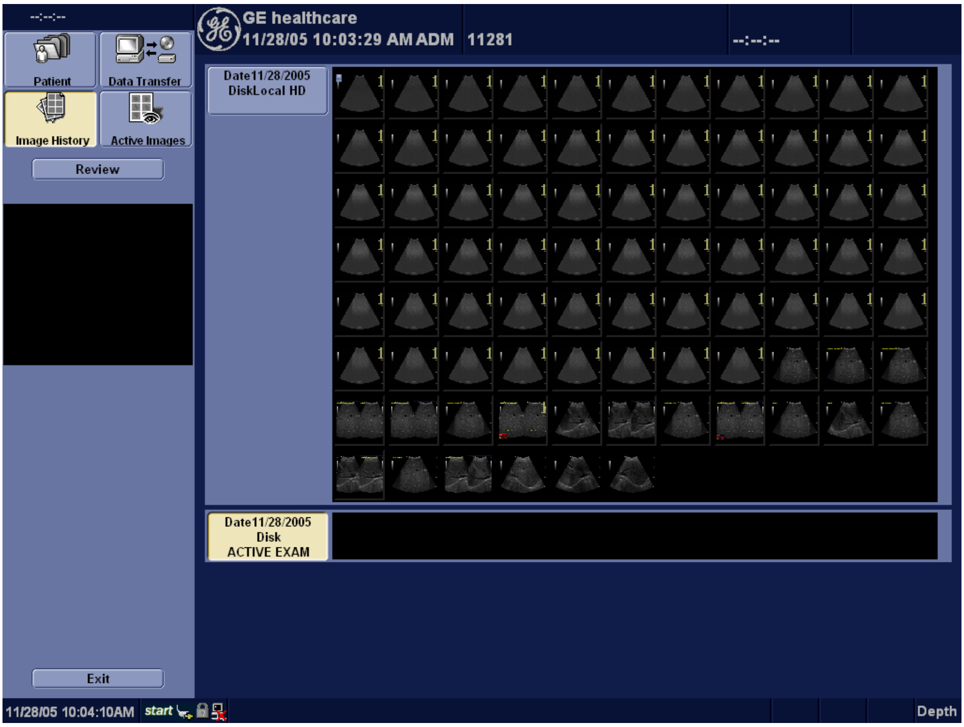

--:--:--
Patient
Data Transfer
Image History
Active Images
Review
Exit
GE healthcare
11/28/05 10:03:29 AM ADM
11281
--:--:--
Date11/28/2005
DiskLocal HD
Date11/28/2005
Disk
ACTIVE EXAM
11/28/05 10:04:10AM
start
Depth

Figure 4-16. Image History Screen

4. Move the cursor to the required image for review.
5. Select ***Review***. The selected image (maximum of 4 images) is displayed.

Reviewing the Image (continued)

If the image data is saved on a disk and you do not insert the disk when displaying the Image History page, a triangle icon displays instead of a thumbnail.

Place the cursor on the icon. The disk name displays under the preview window. Insert the appropriate disk.

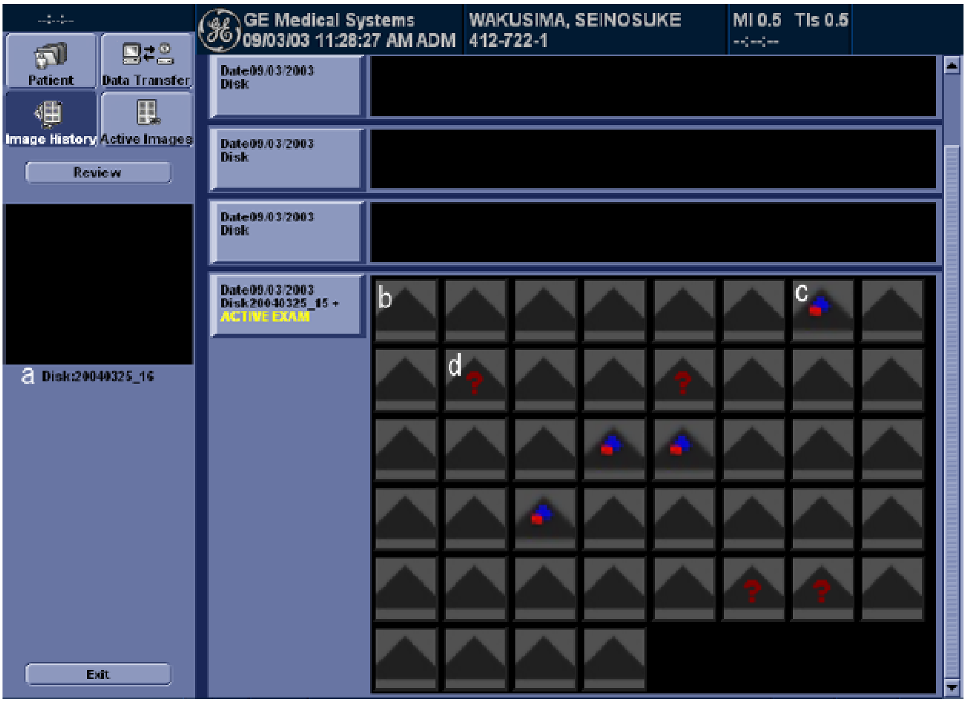

GE Medical Systems
09/03/03 11:28:27 AM ADM
WAKUSIMA, SEINOSUKE
412-722-1
MI 0.5 TIs 0.5
Patient
Data Transfer
Image History
Active Images
Review
a
Disk:20040325_16
Exit
Date09/03/2003
Disk
Date09/03/2003
Disk
Date09/03/2003
Disk
Date09/03/2003
Disk20040325_15 +
ACTIVE EXAM
b
c
d

Figure 4-17. Image History (without disk in drive)

a. Name of the disk displayed under the preview window
b. Raw data B-Mode image
c. Raw data Color image
d. Image which does not have raw data (screen capture image)

Deleting the existing patient/exam/image

CAUTION

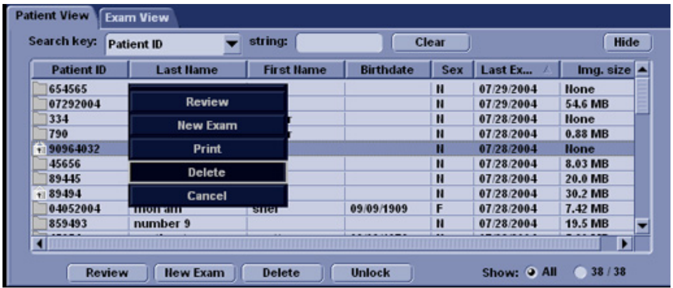
Before deleting a patient or image from the Patient Screen, make sure you have already saved the data with EZBackup/ EZMove or Export. Verify the media before deletion.

Deleting the existing patient

1. Search and select the patient in the patient list with the **Ctrl** or **Shift** keys.
2. Select ***Delete***. The confirmation dialog box displays.

   OR

   Press the left **Set** key. A pop-up menu displays. Select ***Delete***. The confirmation dialog box displays.



Search key: Patient ID

string:

Patient ID	Last Name	First Name	Birthdate	Sex	Last Ex...	Img. size
654565				N	07/29/2004	None
07292004				N	07/29/2004	54.6 MB
334				N	07/28/2004	None
790				N	07/28/2004	0.88 MB
90964032				N	07/28/2004	None
45656				N	07/28/2004	8.03 MB
89445				N	07/28/2004	20.0 MB
89494				N	07/28/2004	30.2 MB
04052004	[illegible]	[illegible]	09/09/1909	F	07/28/2004	7.42 MB
859493	number 9			N	07/28/2004	19.5 MB

Show: ● All ○ 38 / 38

Figure 4-18. Select the patient in the patient list

3. Select OK to delete or Cancel.

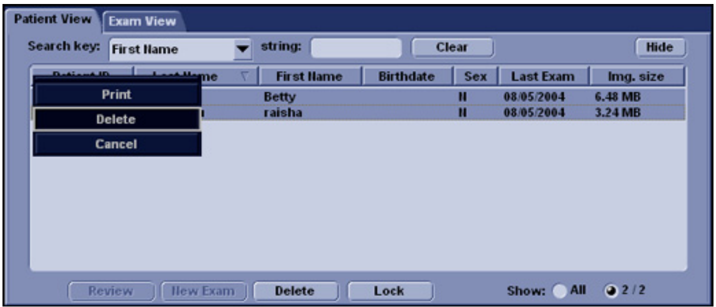
Deleting the existing patient/exam/image (continued)

Delete multiple patients from the patient list

1. Select the multiple patients to be deleted from the patient list.
2. Select ***Delete***. The confirmation dialog box displays.

   OR

   Press the left **Set** key. A pop-up menu displays. Select ***Delete***. The confirmation dialog box displays.



Search key: First Name
string:

		First Name	Birthdate	Sex	Last Exam	Img. size
		Betty		N	08/05/2004	6.48 MB
		raisha		N	08/05/2004	3.24 MB

Figure 4-19. Select deleted patients in the patient list

3. Select **OK** to delete or **Cancel**.

Deleting the existing exam

1. Search and select the patient in the patient list.
2. Select ***Review***.
3. The patient exam screen displays. Select the exam to be deleted.
4. Select ***Delete***. The confirmation dialog box displays.
5. Select OK to delete or Cancel.

Deleting the existing image

1. Search and select the patient in the patient list.
2. Select ***Review***. The patient exam screen displays.
3. Select the exam which contains the image to be deleted.
4. Select ***Active Images*** to display the image list.
5. Select the image to delete and select ***Delete***. The confirmation dialog box displays.
6. Select **Yes** to delete or **No** to cancel.

Changing Patient Information or an Exam

If patient information needs to be edited, press ***Patient*** to modify information.

If the patient is still active, you can go to the New Patient page and choose the tab that is desired. The exam changes in the Exam View area.

If the exam category needs to be changed, select ***New Exam*** to modify the Patient Screen without erasing accumulated patient images, measurements, annotations, calculations and worksheets.

1. Display the Patient screen by pressing ***Patient***.
2. Select patient from the Patient list. The system automatically searches to see if the patient is already in the database.
    - Select Search key (Patient Data: ID, First Name, Last Name, Birthdate, Sex or Exam Date.
    - Enter search string (for example, initial letter of Patient Name)
3. The appropriate patient is displayed.

   If patient information needs to be edited or the exam category changed, use the New Exam feature. Selecting ***New Exam*** allows modification of the Patient Screen without erasing accumulated patient images, measurements, annotations, calculations and worksheets.
4. Select ***Resume Exam*** or ***New Exam*** to register the new exam.

   A new exam is automatically created on that patient unless an exam already exists on that day for that patient.
5. To display the patient information on the title bar, press the ***Esc*** key or the **B-Mode** key.

   Select the Preset and appropriate probe Top/Sub Menu keys, if necessary.

Selecting an Application Preset and a probe

Selecting an Application Preset

Press the **Preset** key.

The exam category preset that best describes the desired exam to be performed is chosen after the exam category is selected. The factory default preset selections are displayed on the Application screen.

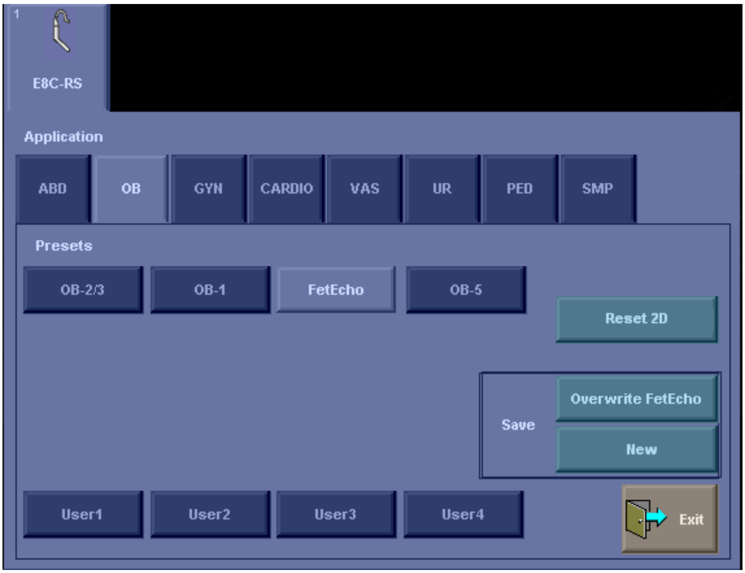

1
E8C-RS
Application
ABD
OB
GYN
CARDIO
VAS
UR
PED
SMP
Presets
OB-2/3
OB-1
FetEcho
OB-5
Reset 2D
Save
Overwrite FetEcho
New
User1
User2
User3
User4
Exit

Figure 4-20.   OB Preset Selection Screen

Use these parameters as a starting point for the exam.

User-Defined Application Presets

There are four user-defined application presets that can be set on the system.

To set up User-Defined Application Presets,

1. From the keyboard, press the **Preset** key. The Probe screen appears.

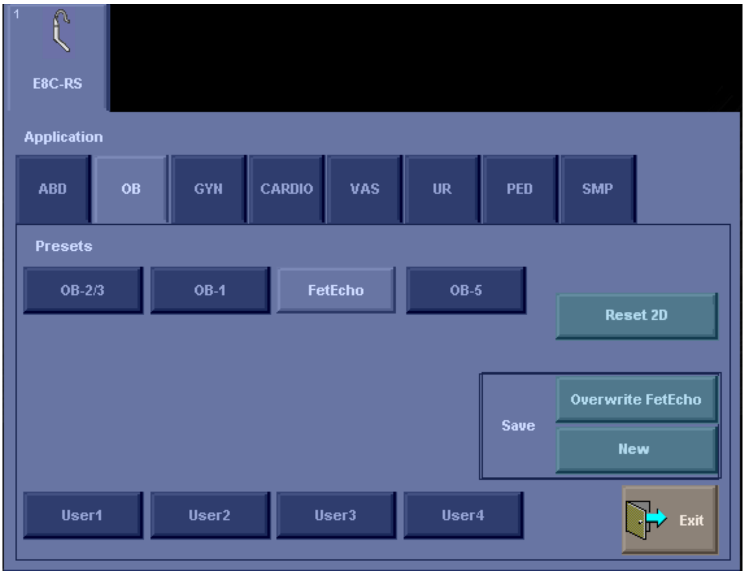

1
E8C-RS
Application
ABD
OB
GYN
CARDIO
VAS
UR
PED
SMP
Presets
OB-2/3
OB-1
FetEcho
OB-5
Reset 2D
Save
Overwrite FetEcho
New
User1
User2
User3
User4
Exit

Figure 4-21. Probe Screen

2. Select ***New***. A pop-up menu appears:

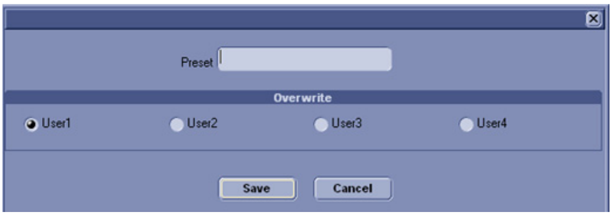

Preset
Overwrite
● User1
○ User2
○ User3
○ User4
Save
Cancel

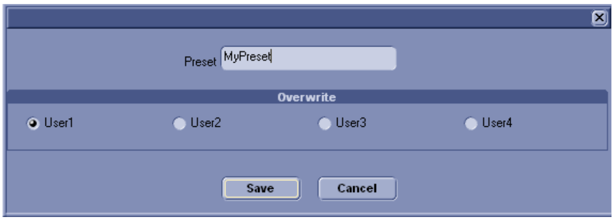
Figure 4-22. Create New User Application Menu

NOTE: *The new user application is based upon the current exam category and application, plus any modifications you have made, including the comment library and M&A calcs.*

User-Defined Application Presets (continued)

3. Type the name of the new application. Specify which User Top/Sub Menu key you want to use and press ***Save***.

NOTE: *The name of the new application cannot include spaces or symbols. However, the name can include numbers and letters.*



Preset MyPreset

Overwrite
● User1
○ User2
○ User3
○ User4
Save
Cancel

Figure 4-23. Create New User Application Menu

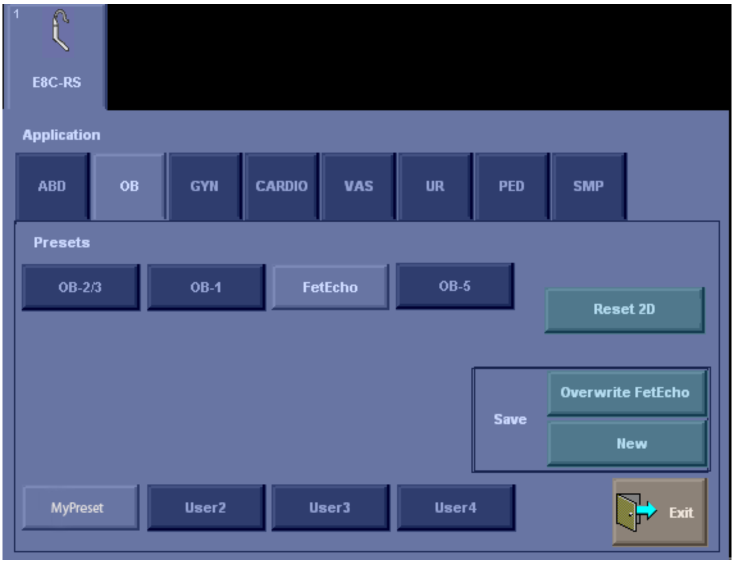

1
E8C-RS
Application
ABD
OB
GYN
CARDIO
VAS
UR
PED
SMP
Presets
OB-2/3
OB-1
FetEcho
OB-5
Reset 2D
Save
Overwrite FetEcho
New
MyPreset
User2
User3
User4
Exit

Figure 4-24. New User Application

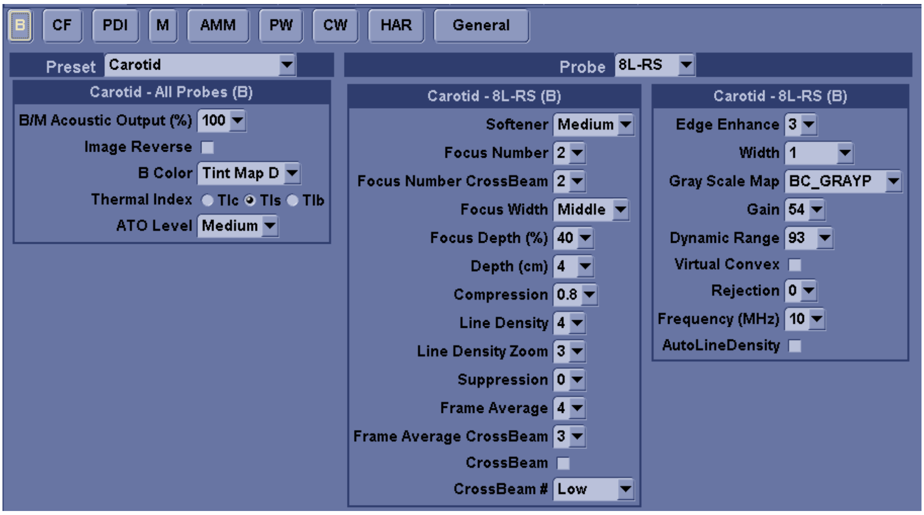
The new application now appears on the Top/Sub Menu.

NOTE: *You can set up to four (4) user-defined application presets for each exam category.*

User-Defined Application Presets (continued)

4. To view/edit the parameters for the user-defined preset, press Utility --> Imaging.

   If you change the settings for this application, make sure to save the changes via Save --> Overwrite (user application).



Preset Carotid

Probe 8L-RS

Carotid - All Probes (B)

B/M Acoustic Output (%) 100
Image Reverse ☐
B Color Tint Map D
Thermal Index ○ TIc ● TIs ○ TIb
ATO Level Medium

Carotid - 8L-RS (B)

Softener Medium
Focus Number 2
Focus Number CrossBeam 2
Focus Width Middle
Focus Depth (%) 40
Depth (cm) 4
Compression 0.8
Line Density 4
Line Density Zoom 3
Suppression 0
Frame Average 4
Frame Average CrossBeam 3
CrossBeam ☐
CrossBeam # Low

Carotid - 8L-RS (B)

Edge Enhance 3
Width 1
Gray Scale Map BC_GRAYP
Gain 54
Dynamic Range 93
Virtual Convex ☐
Rejection 0
Frequency (MHz) 10
AutoLineDensity ☐

Figure 4-25. Imaging Presets for User-Defined Application

NOTE: *If you select Reload Factory Defaults for the User-Defined application that you created, the settings for this user-defined application revert back to the factory settings for the exam category and application it was based upon.*

NOTE: *Currently, there is no way to delete a user-defined application.*

Selecting a probe

Select the appropriate probe from the probe indicator. Probes can be used in more than one exam category/application.

- Always start out with a probe that provides optimum focal depths and penetration for the patient size and exam.
- Begin the scan session using the default Power Output setting for the probe and exam.

Ending a Patient Exam

When you have completed the study, press ***End Exam***, End Current Patient or New Patient, then Store All Images Permanently.

Chapter 5

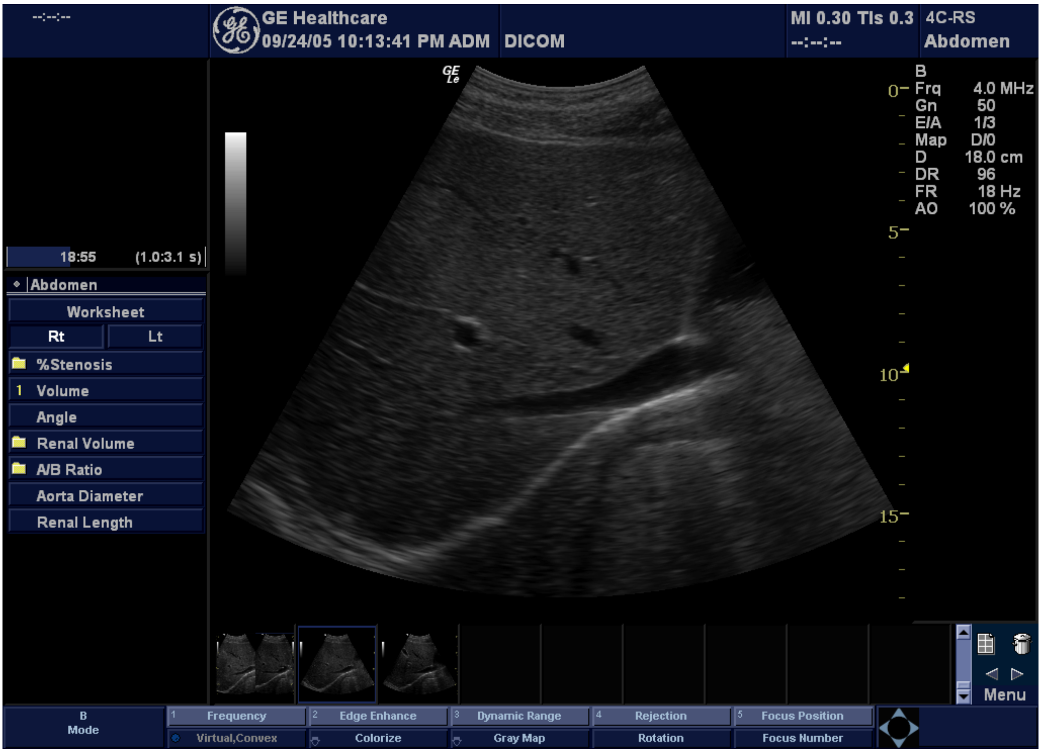
Optimizing the Image

Describes how to adjust the image. This chapter is broken into the following sections: B-Mode, M-Mode, Color Flow Mode, Doppler Mode, and 3D Mode.

Optimizing B-Mode

Intended Uses

B-Mode is intended to provide two-dimensional images and measurement capabilities concerning the anatomical structure of soft tissue.



GE Healthcare
09/24/05 10:13:41 PM ADM DICOM
MI 0.30 TIs 0.3
4C-RS
Abdomen

B
Frq 4.0 MHz
Gn 50
E/A 1/3
Map D/0
D 18.0 cm
DR 96
FR 18 Hz
AO 100 %

18:55 (1.0:3.1 s)

--:--:--
0
5
10
15
Abdomen
Worksheet
Rt
Lt
%Stenosis
1 Volume
Angle
Renal Volume
A/B Ratio
Aorta Diameter
Renal Length
Menu
B Mode
1 Frequency
Virtual,Convex
2 Edge Enhance
Colorize
3 Dynamic Range
Gray Map
4 Rejection
Rotation
5 Focus Position
Focus Number

Figure 5-1. B-Mode Display

Typical B-Mode Exam Protocol

A typical examination using B-Mode might proceed

1. Record exam-related patient information. Verify system setup (probes and presets).
2. Position the patient and the console for optimum operator and patient comfort. Perform the scan.
3. Complete the study by collecting all the data.

B-Mode Top/Sub Menu

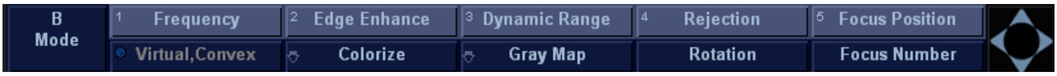
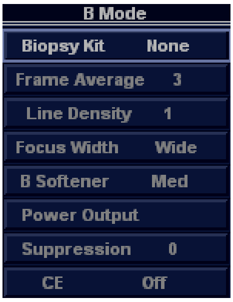

B
Mode
1 Frequency
Virtual,Convex
2 Edge Enhance
Colorize
3 Dynamic Range
Gray Map
4 Rejection
Rotation
5 Focus Position
Focus Number

Figure 5-2. B-Mode Top/Sub Menu


B Mode

Biopsy Kit None

Frame Average 3

Line Density 1

Focus Width Wide

B Softener Med

Power Output

Suppression 0

CE Off

Dual Purpose Controls

The following share the same controls. Press the control to toggle between functions:

- Focus Position and Focus Number
- Frequency and Virtual Convex
- Dynamic Range and Edge Enhance
- Gray Map and Colorize
- Rotation (Updown Invert) and Rejection

B-Mode Scanning Hints

HINTS

These B-Mode controls produce the following results:

Tissue Harmonics. Enhances near and mid field resolution for improving imaging contrast and reducing noise as well as far field penetration.

Frequency. Changes system parameters to best optimize for a particular patient type.

Gray Map. Affects the presentation of B-Mode information. Choose the gray map prior to making other adjustments. There is an interdependency between gray maps, gain, and dynamic range. If you change a map, revisit gain and dynamic range settings.

Dynamic Range. Affects the amount of gray scale information displayed. If you increase the gain, you may want to decrease the Dynamic Range.

Edge Enhance. Affects the amount of border crispness.

Frame Average. Smooths the image by averaging frames. Affects the amount of speckle reduction.

B Softener. Affects the amount of lateral smoothing.

TGC. Adjust TGC to adjust Gain in specific areas.

Focus Number/Position. The best focusing is at the focal zone location. Put focal zone(s) at the area of interest. Be conscious of where the focal zones are. Focal zones must be moved to track at the center of the anatomy of interest.

Scan Area. Sizes region of interest. Adjust the Scan Area to the smallest reasonable size to maximize frame rate.

Depth

Description	Depth controls the distance over which the B-Mode images anatomy. To visualize deeper structures, increase the depth. If there is a large part of the display which is unused at the bottom, decrease the depth.
Adjusting	Each adjustment cycles you to the next Depth setting. Imaging and display parameters adjust automatically. To increase/decrease, adjust **Depth**.
Preset	You can reverse how the Depth control functions on the Utility -> System -> General page. You can set the depth by probe and application on the Utility --> Imaging page.
Values	Depth increments vary by probe and application. Depth displays on the monitor in centimeters. Depth values are returned to the factory or user preset value when you change the following: Probe, Exam Category/Exam Calc, or New Patient.
Benefits	Depth adjusts your field of view. It increases your field of view to look at larger or deeper structures; it decreases your field of view to look at structures near the skin line.
Affect on other controls	After adjusting the depth, you may need to adjust the **TGC** and focus. Changing Depth, • Clears Cine memory. • Erases real-time calculations graphics on the display (but not the completed results on the worksheet page).
Bioeffects	Changing the depth may change the TI and/or MI. Observe the output display for possible effects.
HINTS	Make sure enough space is left below the anatomy of interest to demonstrate shadowing or enhancement.

Gain

Description

B-Mode Gain increases or decreases the amount of echo information displayed in an image. It may have the effect of brightening or darkening the image if sufficient echo information is generated.

Adjusting

Gain values vary depending on the probe; they are not associated with a particular position of the knob.

NOTE: TruAccess allows you to change the gain on a frozen image. B-Mode gain is independent of M-Mode and Doppler and Color Flow Gain. Changing the M-Mode Gain while in M-Mode does not affect the B-Mode image gain.

To decrease/increase, rotate **Gain**.

Preset

You can set gain by probe and application on the Utility --> Imaging page.

Values

Gain displays on the monitor in Gn (dB). Maximum gain varies by probe. Gain values vary by probe, application, and frequency setting.

NOTE: Maximum gain is factory preset to an optimum setting to eliminate noise in the display.

Gain values are returned to the factory or user preset value when you change the following: Probe, Exam Category/Exam Calc, or New Patient.

Benefits

Gain allows you to balance echo contrast so that cystic structures appear echo-free and reflecting tissue fills in.

Affect on other controls

After you adjust the Power Output, you may need to adjust the gain. Generally speaking, if you increase the Power Output, you need to decrease the gain; if you decrease the Power Output, you need to increase the gain. Gain and TGC interact by adding together.

Bioeffects

Gain has no affect on Power Output. However, with increased gain, the power output level can usually be reduced to produce an equivalent image quality.

NOTE: Always optimize gain before increasing the Power Output.

Focus

Description	Increases the number of focal zones or moves the focal zone(s) so that you can tighten up the beam for a specific area. A graphic caret corresponding to the focal zone position(s) appears on the right edge of the image.
Adjusting	To increase/decrease the number of focal zones, adjust Focus Number.
NOTE:	*Focus Position and Focus Number share the same control. Press the control to toggle between Focus Position and Focus Number.*
	To move the focal zone to the near/far field, adjust Focus Position. Focal zones adjust automatically when you adjust the depth.
Preset	You can reverse how the Focus control functions on the Utility -> System -> General page.
NOTE:	*Each adjustment cycles you to the next setting.*
	You can set the focus (Depth %, Number, and Number Crossbeam) by probe and application on the Utility --> Imaging page.
Values	Focus zone number and position vary depending on the depth, zoom, probe, application, and frequency setting selected.
	Focal zone number values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calc, or New Patient.
Benefits	Focus optimizes the image by increasing the resolution for a specific area.
Affect on other controls	Changing the focal number affects the frame rate. The greater number of focal zones, the slower the frame rate.
Bioeffects	Changing the focal zone may change the TI and/or MI. Observe the output display for possible effects.

Auto Optimize (Auto)

Description	Auto Optimize (Auto) lets you optimize the image based upon a the actual B Mode image data (Auto Tissue Optimize, ATO). The preset levels (Low, Medium, and High) allow you to pick a preference for the contrast enhancement in the resulting image. Low does the least amount of contrast enhancement, high does the most. Auto is available in single or multi image, on live, frozen or CINE images (in B-Mode only), and while in zoom, in Color Flow Mode, and in Spectral Doppler. Auto in Color Flow Mode automatically adjusts the overall color gain. Auto in PW Doppler Mode optimizes the spectral data. Auto adjusts the Velocity Scale/PRF (live imaging only), baseline shift, dynamic range, and invert (if preset). Upon deactivation, the spectrum is still optimized.
Benefit	Auto can be found in reduced optimization time and a more consistent and accurate optimization process.
Adjusting	To activate, press **Auto**.
Preset	To specify the ATO level, press Utility -> Imaging -> B-Mode -> ATO Level. Three ATO levels are available: Low, Medium, or High.
Values	Auto is active until you deactivate it or when you change the following: Probe, Exam Category, Exam Calc, or New Patient.
Affect on other controls	You may need to adjust the Gain.

CrossBeam (Compounding)

Description

CrossBeam is the process of combining three or more frames from different steering angles into a single frame. CrossBeam is available only on Linear probes.

Adjusting

CrossBeam combines frames steered from a minimum of three different angles and up to a maximum of five steer angles.

To activate CrossBeam, press ***F9*** (which is predefined under Utility -> Admin -> Function Key).

Preset

You can preset B-Mode CrossBeam:

- To activate upon entering B-Mode
- Preset the CrossBeam #
- Preset Focus Number CrossBeam
- Frame Average CrossBeam

These presets can be made via the Utility --> Imaging page.

CrossBeam (Compounding) (continued)

Values

Most of the linear probes are supported. Multiple focal zones are supported. B-Mode CrossBeam is available while in B-Mode. Steering is optimized by probe. The displayed compound image depth is equal to the image depth of the non-steered frame.

The following features are supported in CrossBeam:

- Harmonic Imaging
- CINE Loops acquired using CrossBeam.
- All Measurement and Analysis packages
- Line Density, Depth, Map, TGC, Gain, Edge Enhance, Frame Averaging, Compression, Colorize, Acoustic Output, Rejection, Rotation, B-Softener, Auto, Reverse, Dynamic Range, Biopsy

The following controls are not available:

- Anatomical M-Mode
- 3D Imaging

Benefits

The combined single image has the benefits of reduced speckle noise, reduced clutter, and continuity of specular reflectors. Therefore, this technique can improve contrast resolution with increased conspicuity of low contrast lesions, better detection of calcifications, biopsy needle visualization, and cystic boundary definition.

M/D Cursor

Description	Displays the M/D-Mode cursor on the B-Mode image.
Adjusting	To activate/deactivate the M/D-Mode cursor, press **M/D Cursor**. **Trackball** to position M/D-Mode cursor.
Values	On/Off.
Benefits	Lets you position the cursor before you go into M-Mode or Doppler Mode so that you can make optimum use of the larger B-Mode image.

Harmonics

Description	Harmonics enhances near field resolution for improved small parts imaging as well as far field penetration.
Adjusting	To activate Harmonic imaging, Select the Harmonics key.
NOTE:	*Multi frequency is not active when the image is frozen.*
Values	On/Off. See Chapter 17 for probe availability. `THI' appears next to the active probe indicator.
NOTE:	*Changing multi frequency resets those parameters which are presettable by frequency to their preset values for the current harmonic frequency.* Multi frequency values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Application, or New Patient.
Benefits	Harmonics diminishes low frequency high amplitude noise and improves imaging technically difficult patients. Harmonics may be especially beneficial when imaging isoechoic lesions in shallow-depth anatomy in the breast, liver, and hard-to-visualize fetal anatomy. Harmonics may improve B-Mode image quality without introducing a contrast agent.
Affect on other controls	You may need to change the field of view (Depth). DO NOT use contrast agents while in Tissue Harmonics.
Bioeffects	Activating multi frequency mode may change the TI and/or MI. Observe the output display for possible effects.

Frequency

Description

Multi Frequency mode lets you downshift to the probe's next lower frequency or shift up to a higher frequency.

Adjusting

To select a new frequency,

1. Select ***Frequency***.
2. Select the desired frequency.

NOTE: *Frequency change is not active when the image is frozen.*

The selected frequency appears in the upper, right-hand portion of the monitor display.

NOTE: *Changing frequency resets those parameters which are presettable by frequency to their preset values for the current frequency.*

Values

Vary, depending on the probe and application.

Frequency values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

Benefits

This optimizes the probe's wide band imaging capabilities at multiple frequencies to image at greater depths.

Bioeffects

Activating multi frequency mode may change the TI and/or MI. Observe the output display for possible effects.

Virtual Convex

Description	On Linear probes, Virtual Convex provides a larger field of view in the far field. Virtual Convex is always active with linear probes.
Adjusting	To activate/deactivate Virtual Convex, select ***Virtual Convex***.
Values	On/Off.
Benefits	Virtual Convex allows for a wider field of view. Available in B-Mode, Color Flow Mode, and Doppler Mode.
Bioeffects	Activating Virtual Convex may change the TI and/or MI. Observe the output display for possible effects.
NOTE:	*Color Flow can be steered when in straight fire, but not in Virtual Convex.*

TGC

Description	TGC amplifies returning signals to correct for the attenuation caused by tissues at increasing depths. TGC slide pots are spaced proportionately to the depth. The area each pot amplifies varies as well. A TGC curve may appear on the display (if preset), matching the controls that you have set (except during zoom). You can choose to deactivate the TGC curve on the image.
Adjusting	To decrease/increase TGC, move slide pot to the left/right.
NOTE:	*TGC adjusts automatically when using zoom.*
Values	When you change the depth, TGC is rescaled across the new depth range. Each pot is proportionately scaled across the depth.
Preset	On/Off -- preset via Utility --> System --> System Imaging.
Benefits	TGC balances the image so that the density of echoes is the same throughout the image.

Scan Area

Description	You can widen or narrow the size of the sector angle to maximize the image's region of interest (ROI).
Adjusting	To narrow/widen the angle, press **Scan Area** until *Width* is highlighted in the message line and move the **Trackball** left/right to decrease/increase the angle size. Then press **Scan Area** to set the ROI.
Values	Varies, depending upon the probe (not applicable to linear probes) and application.
Benefits	Increase the sector angle to see a wide field of view; decrease the sector angle when you need to have a faster frame rate, as in fetal heart.
Affect on other controls	Changing the sector angle affects the frame rate. The narrower the sector angle, the faster the frame rate.
Bioeffects	Changing the sector angle may change the TI and/or MI. Observe the output display for possible effects.

Tilt

Description	You can steer the sector angle to get more information without moving the probe while in B-Mode, M-Mode, Doppler Mode, and Color Flow Mode. *Tilt* is not available on Linear probes.
Adjusting	To steer the angle to the left/right, press **Scan Area** until *Tilt* is highlighted, then move the **Trackball** to the left/right.
Values	Varies, depending on the probe.
Benefits	Allows you to move a reduced sector angle laterally, without moving the probe. Beneficial in GYN.
Bioeffects	Steering the sector angle may change the TI and/or MI. Observe the output display for possible effects.

Angle Steer

Description	You can steer the PW Doppler or Color Flow sector angle to get more information without moving the probe.
Adjusting	To steer the angle to the left/right, press **Angle Steer**, then move the **Trackball** to the left/right.
Values	Varies, depending on the probe.
Benefits	Allows you to move a reduced sector angle laterally, without moving the probe. Beneficial in GYN. And it allows you to vary the angle so the scan is not perpendicular to the direction of the flow.
Bioeffects	Steering the sector angle may change the TI and/or MI. Observe the output display for possible effects.

Reverse

Description	Flips the image 180 degrees left/right.
Adjusting	To flip the image 180 degrees, select Reverse.
Values	The image rotates in 180 degrees left/right. Reverse settings vary by probe and application. Reverse settings are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.
Benefits	Used for anatomical correctness.

CAUTION	When reading a reverse image, be careful to observe the probe orientation to avoid possible confusion over scan direction or left/right image reversal.

Dynamic Range (Compression)

Description	Dynamic Range controls how echo intensities are converted to shades of gray, thereby increasing the adjustable range of contrast. The Dynamic Range control name changes to Compression on frozen images.
Adjusting	To increase/decrease, adjust Dynamic Range.
Values	The settings cycle in 3 dB steps from 30 dB to 120 dB (except the 8L-RS probe which ranges from 30 dB to 150 dB). The current value displays. Dynamic Range values vary by probe, application, and frequency setting. Dynamic Range levels are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, New Patient, or Multi Frequency.
Benefits	Dynamic Range is useful for optimizing tissue texture for different anatomy. Dynamic Range should be adjusted so that the highest amplitude edges appear as white while lowest levels (such as blood) are just visible.
Affect on other controls	Dynamic range operates in realtime, Freeze, CINE, and CINE Timeline. It also affects Gain.

Line Density

Description	Optimizes B-Mode frame rate or spatial resolution for the best possible image.
Adjusting	Press ***Line Density*** right to increase resolution or left to increase frame rate.
Values	Varies by probe.
NOTE:	*Not available in timeline.*
	Values vary by probe and application. Line Density values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.
Benefits	A lower line density is useful in fetal heart beat, adult cardiac applications and in clinical Radiology applications requiring significantly higher frame rates. A higher line density is useful in obtaining very high resolution, e.g., thyroid, testicles.
Affect on other controls	Line density changes the vector density and frame rate.
Bioeffects	Activating color flow line density may change the TI and/or MI. Observe the output display for possible effects.

Map

Description	The system supplies B, M, and Doppler Mode system maps.
Adjusting	To select a map, press ***Gray Map***. A map window displays. The image reflects the map as you go through the selections.
Values	Gray maps gradually change from least contrasty or softest to most contrasty. Clear Maps provide a more transparent map. Map values vary by probe, application, and multi frequency setting. Map values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

Map	Description
Gray Map A	Assigns a greater amount of gray scale pixel values to bright reflectors in the image. Useful when imaging abdomen, liver, kidney, OB, pelvic, etc.
Gray Map B	Assigns a greater amount of gray scale pixel values to bright reflectors in the image. Useful when the abdomen, liver, kidney, OB, pelvic, etc.
Gray Map C	Assigns a greater amount of gray scale pixel values to bright reflectors in the image. Useful when imaging the abdomen, liver, kidney, OB, pelvic, etc.
Gray Map D	Assigns a lesser amount of gray scale pixel values to bright reflectors in the image, compared to Maps B and C. Useful when imaging bright carotid plaque reflectors.
Gray Map E	Assigns an equal amount of gray scale pixel values to all reflectors in the image. Useful when imaging tissue with bright reflectors, e.g., cyst with septations or calcifications.
Gray Map F	Assigns a lesser amount of gray scale pixel values to bright reflectors in the image. Useful when imaging arteries and grafts.
Gray Map G	Assigns a lesser amount of gray scale pixel values to weak reflectors in the image than Map F. Useful when imaging small parts.
Gray Map H	Assigns an s-shape to gray scale pixel values. Useful when imaging anatomical signals with less tissue differentiation, e.g., tendon, vein, carotid, thyroid, breast, etc.
Gray Map I	S-shaped map. This map highlights tissue differentiation for a certain band of signals. Useful when imaging structures where you want more contrast, e.g., renal, tendon, vein, carotid, thyroid, breast, etc.
Gray Map J	S-shaped map. This map highlights tissue differentiation for a certain band of signals. Useful when imaging structures where you want more contrast, e.g., renal, tendon, vein, carotid, thyroid, breast, etc.
Gray Map K	S-shaped map. This map highlights tissue differentiation for a certain band of signals. Useful when imaging structures where you want more contrast, e.g., renal, tendon, vein, carotid, thyroid, breast, etc.
Gray Map L	S-shaped map. This map highlights tissue differentiation for a certain band of signals. Useful when imaging structures where you want more contrast, e.g., cardiology.
Gray Map M	Assigns a lesser amount of gray scale pixel values to weak reflections in the image than Map C. Useful when imaging abdomen and liver.

Map	Description
Gray Map N	S-shaped map. This map highlights tissue differentiation for a certain band of signals. Useful when imaging structures where you want more contrast, e.g., renal, tendon, vein, carotid, thyroid, breast, Cardiology, etc.
Gray Map O	S-shaped map. This map highlights tissue differentiation for a certain band of signals. Useful when imaging structures where you want more contrast, e.g., renal, tendon, vein, carotid, thyroid, breast, Cardiology, etc.
Gray Map P	Assigns a lesser amount of gray scale pixel values to weak reflectors in the image than Map M. Useful when imaging abdomen and liver.
Gray Map Q	Assigns a lesser amount of gray scale pixel values to weak reflectors in the image than Map R. Useful when imaging thyroid and abdomen.
Gray Map R	Assigns a lesser amount of gray scale pixel values to weak reflectors in the image than Map C. Useful when imaging thyroid and abdomen.
Gray Map S	For Contrast Mode
Gray Map T	For Contrast Mode
Gray Map U	For Contrast Mode

Frame Average

Description	Temporal filter that averages frames together, thereby using more pixels to make up one image. This has the effect of presenting a smoother, softer image.
Adjusting	To adjust frame averaging, adjust Frame Average on the Top/ Sub Menu.
Values	The current value displays on the Top/Sub Menu. Frame Average values vary by probe, application, and multi frequency setting. Frame Average values are returned to the preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.
Benefits	Smooths the image.

Colorize

Description

Colorize is the colorization of a conventional B-Mode image or Doppler Spectrum to enhance the user's ability to discern B, M, and Doppler Mode intensity valuations. Colorize is NOT a Doppler Mode.

NOTE: You can colorize realtime or CINE images or Timeline CINE.

Colorizes the gray scale image to enhance the eye's discrimination capability.

Spectrum Colorize colorizes the spectrum as a function of power using the inverse of the Colorize map for the signal intensity in each Doppler line.

Colorize enhances the visibility of the spectrum's characteristics and enhances your ability to identify spectral broadening and the edge contours of the spectrum used to define the peak frequency/velocity.

The gray bar displays while Colorize is activated.

Adjusting

To activate Colorize,

1. Select ***Colorize*** on the Top/Sub Menu.
2. **Trackball** to cycle through available maps.
3. Press **Set** to select.

To deselect, select a gray map.

Edge Enhance

Description	Edge Enhance brings out subtle tissue differences and boundaries by enhancing the gray scale differences corresponding to the edges of structures. Adjustments to M-Mode's edge enhancement affects the M-Mode only.
Adjusting	To cycle through settings, adjust ***Edge Enhance*** on the Top/Sub Menu.
Values	0-5, with 0 = Off and 5 = High. The current value displays on the Top/Sub Menu. Values vary by probe, application, and multi frequency setting. Values are returned to the preset value when you change: Probe, Exam Category, Exam Calcs, or New Patient.
Benefits	Edge Enhance cleans out the B-Mode image/M-Mode timeline by subduing some of the gray scale in order to highlight the vessel wall or organ. This is helpful when you cannot differentiate between the chambers of the heart.
Affect on other controls	Edge Enhance operates in realtime only; not in Freeze or CINE.

Rotation

Description	Flips the image 180 degrees up/down.
Adjusting	To flip the image vertically, select ***Rotation***.
Values	Up/down. Values vary by probe and application. Values are returned to the preset value when you change: Probe, Exam Category, Exam Calcs, or New Patient.
Benefits	Beneficial in transvaginal and transrectal scanning.

⚠ CAUTION

When reading an rotated image, be careful to observe the probe orientation to avoid possible confusion over scan direction or left/right image reversal.

Rejection

Description	Selects a level below which echoes will not be amplified (an echo must have a certain minimum amplitude before it will be processed).
Adjusting	Adjust to the right to increase and left to decrease.
Values	0-5
Benefits	Allows for the elimination from the display of low level echoes caused by noise.

B Softener

Description	Affects the amount of lateral smoothing. It’s similar to dynamic range by softening the appearance/edges of the image.
Values	Off, Low, Medium, High

Optimizing M-Mode

Intended Use

M-Mode is intended to provide a display format and measurement capability that represents tissue displacement (motion) occurring over time along a single vector.

Introduction

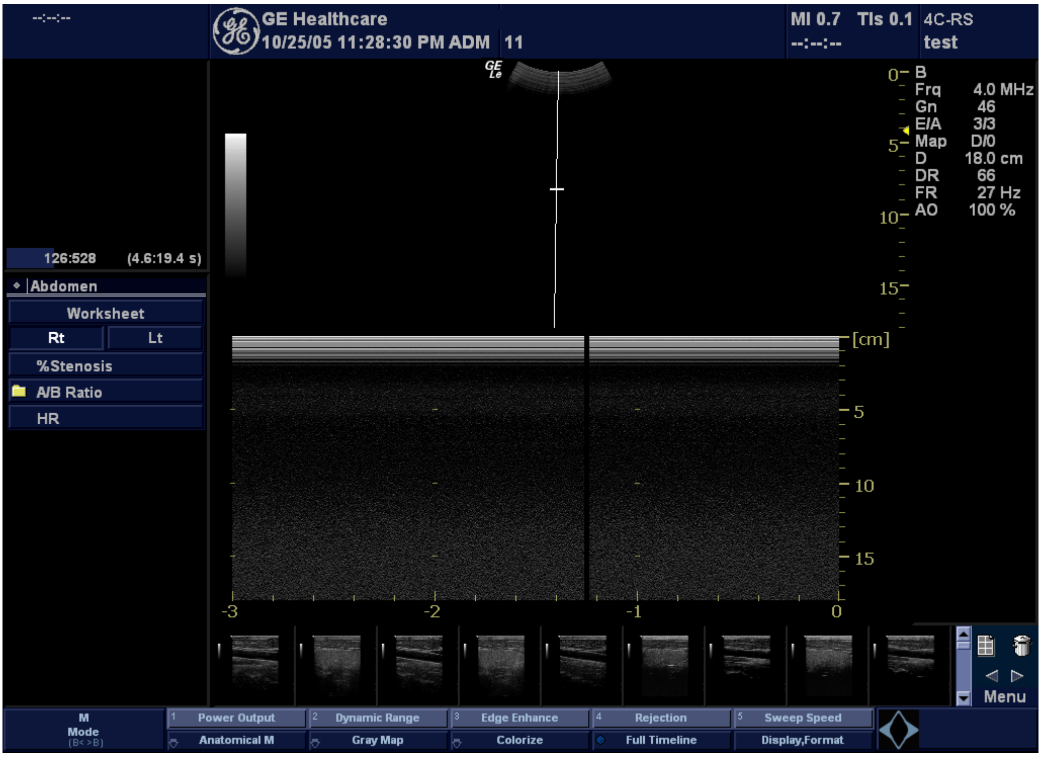
M-Mode is used to determine patterns of motion for objects within the ultrasound beam. The most common use is for viewing motion patterns of the heart.

Typical exam protocol

A typical examination using M-Mode might proceed as follows:

1. Get a good B-Mode image. Survey the anatomy and place the area of interest near the center of the B-Mode image.
2. Press **M/D Cursor**.
3. Trackball to position the mode cursor over the area that you want to display in M-Mode.
4. Press M-Mode.
5. Adjust the Sweep Speed, TGC, Gain, Power Output, and Focus Position, as needed.
6. Press **Freeze** to stop the M trace.
7. Record the trace to disk or to the hard copy device.
8. Press **Freeze** to continue imaging.
9. To exit, press M-Mode.

M-Mode Display



GE Healthcare 10/25/05 11:28:30 PM ADM 11

MI 0.7 TIs 0.1 4C-RS
test

B
Frq 4.0 MHz
Gn 46
E/A 3/3
Map D/0
D 18.0 cm
DR 66
FR 27 Hz
AO 100 %

126:528 (4.6:19.4 s)

--:--:--
--:--:--
0
5
10
15
[cm]
5
10
15
-3
-2
-1
0
Abdomen
Worksheet
Rt
Lt
%Stenosis
A/B Ratio
HR
Menu
M Mode (B< >B)
1 Power Output
Anatomical M
2 Dynamic Range
Gray Map
3 Edge Enhance
Colorize
4 Rejection
Full Timeline
5 Sweep Speed
Display,Format

Figure 5-3. M-Mode Display

M-Mode Display	Description, Format, Values
M-Mode Gain	Displays Overall M-Mode Gain as ##dB.
Depth Scale Indicator	Image depth, in cm.
Time Scale	Eight speeds: 0-7. Major marker = 1 second.
M-Mode Cursor	Displays where the M-Mode Cursor is positioned.

M-Mode Top/Sub Menu

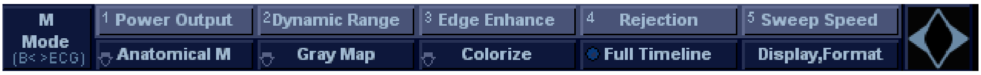

M
Mode
(B< >ECG)
1 Power Output
Anatomical M
2 Dynamic Range
Gray Map
3 Edge Enhance
Colorize
4 Rejection
Full Timeline
5 Sweep Speed
Display,Format

Figure 5-4. M-Mode Top/Sub Menu

Dual Purpose Controls

The following share the same controls. Press the control to toggle between functions:

- Sweep Speed and Full Timeline
- Dynamic Range and Edge Enhance
- Gray Map and Colorize

Scanning Hints

HINTS

These M-Mode controls produce the following results:

Edge Enhance. Affects border sharpness.

Sweep Speed. Controls speed of M-Mode update.

Dynamic Range. Affects the amount of gray scale information displayed.

Sweep Speed

Description	Changes the speed at which the timeline is swept. Available in M-Mode and Doppler Mode. Available in M Color Flow Mode.
Adjusting	To increase/decrease, select ***Sweep Speed***.
Values	Each selection represents a different sweep time. Sweep Speed values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.
Benefits	You can speed up or slow down the timeline to see more or fewer occurrences over time.

Anatomical M-Mode

Description

Anatomical M-Mode gives you the ability to manipulate the cursor at different angles and positions. The M-Mode display changes according to the position of the cursor.

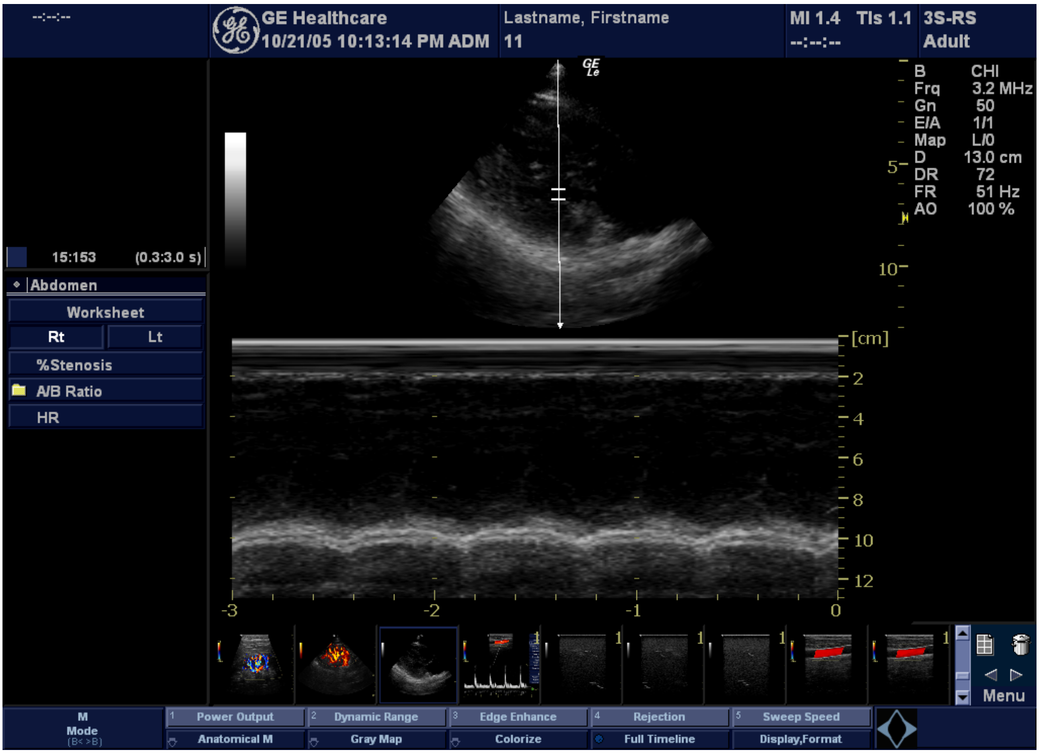

GE Healthcare
10/21/05 10:13:14 PM ADM
Lastname, Firstname
11
MI 1.4
TIs 1.1
3S-RS
Adult
15:153
(0.3:3.0 s)
Abdomen
Worksheet
Rt
Lt
%Stenosis
A/B Ratio
HR
B CHI
Frq 3.2 MHz
Gn 50
E/A 1/1
Map L/0
D 13.0 cm
DR 72
FR 51 Hz
AO 100 %
[cm]
Menu
M Mode
Power Output
Anatomical M
Dynamic Range
Gray Map
Edge Enhance
Colorize
Rejection
Full Timeline
Sweep Speed
Display,Format

Figure 5-5. Anatomical M Mode

Activating

To activate Anatomical M-Mode:

Press the ***Anatomical M*** Top/Sub Menu control.

1. Press **B**-Mode.
2. Press **Freeze**.
3. Press **M**-Mode.
4. Select the ***AnatomicalM*** Top/Sub Menu key.

Anatomical M-Mode (continued)

Adjusting	Use the Top/Sub Menu control and Trackball to position the M cursor over the required area of the B-Mode image. • Adjust the Top/Sub Menu control to move the M cursor to the desired area. • Move the Trackball left/right to move the cursor line left/right. • Press Scan Area to angle the M cursor. • Move the Trackball up/down to move the M cursor up/down.
Values	On/Off.
Benefits	Color Flow Mode and Color M-Mode are Doppler Modes intended to add color-coded qualitative information concerning the relative velocity and direction of fluid motion within the B-Mode or M-Mode image.
Bioeffects	Changing the Packet Size, PRF, and ROI size may change the TI and/or MI. Observe the output display for possible effects.

Optimizing Color Flow

Intended Use

Color Flow Mode is a Doppler Mode intended to add color-coded qualitative information concerning the relative velocity and direction of fluid motion within the B-Mode image.

Introduction

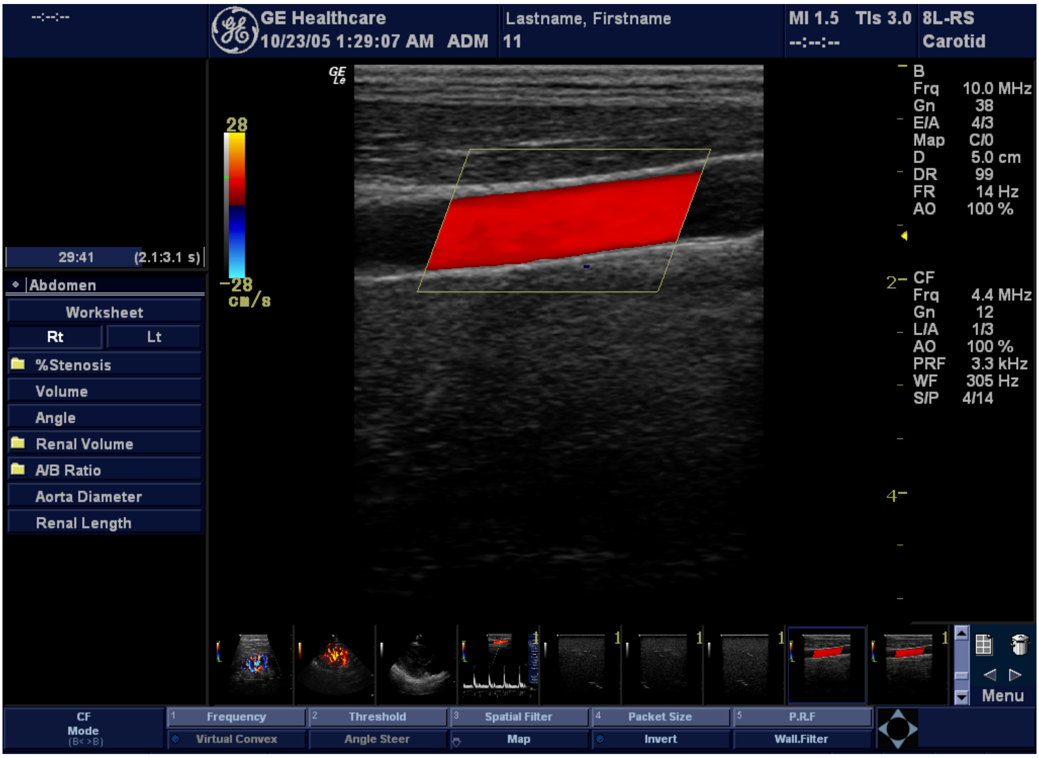
A typical examination using Color Flow Mode,

1. Follow the same procedure as described under B-Mode to locate the anatomical area of interest.
2. After optimizing the B-Mode image, add Color Flow.
3. Move the color flow area of interest as close to the center of the image as possible.
4. Optimize the color flow parameters so that a high frame rate can be achieved and appropriate flow velocities are visualized.
5. Press **Freeze** to hold the image in memory.
6. Record color flow images as necessary.
7. If more definitive information is needed about flow, utilize the procedures described under Doppler Mode.

Activating Color Flow

To activate Color Flow Mode,

1. Press **CF** (Color Flow). The CF window appears over the B-Mode image. Move the **Trackball** to move the CF window.


GE Healthcare
10/23/05 1:29:07 AM ADM
Lastname, Firstname
11
MI 1.5 TIs 3.0 8L-RS
Carotid

B
Frq 10.0 MHz
Gn 38
E/A 4/3
Map C/0
D 5.0 cm
DR 99
FR 14 Hz
AO 100 %

CF
Frq 4.4 MHz
Gn 12
L/A 1/3
AO 100 %
PRF 3.3 kHz
WF 305 Hz
S/P 4/14

--:--:--
28
-28
cm/s
2
4
29:41
(2.1:3.1 s)
Abdomen
Worksheet
Rt
Lt
%Stenosis
Volume
Angle
Renal Volume
A/B Ratio
Aorta Diameter
Renal Length
Menu
CF Mode (B<>B)
1 Frequency
Virtual Convex
2 Threshold
Angle Steer
3 Spatial Filter
Map
4 Packet Size
Invert
5 P.R.F
Wall.Filter

Figure 5-6. Color Flow Mode Display

Uses

Color Flow is useful to see flow in a broad area. Color Flow allows visualization of flow in the CF ROI, whereas Doppler Mode provides spectral information in a smaller area.

Color Flow is also sometimes used as a stepping stone to Doppler. You use Color Flow to locate flow and vessels prior to activating Doppler.

Exiting Color Flow

To exit Color Flow, select **CF**-Mode or **B**-Mode.

Color Flow and Power Doppler Scanning Hints

HINTS

Color Flow Mode controls produce the following results:

Line Density. Trades frame rate for sensitivity and spatial resolution. If the frame rate is too slow, reduce the size of the region of interest, decrease the line density, or reduce the packet size.

Wall Filter. Affects low flow sensitivity versus motion artifact.

Color ***Threshold***. Percentage of gray scale level where color Doppler is overwritten.

Frame Average. Affects temporal smoothing and color Doppler `robustness.'

Packet Size. Affects the amount of color Doppler sensitivity versus frame rate.

Scan Area. Increases/decreases size of color window.

Focus Position. The best focusing occurs at the focal zone caret location. Put focal zone(s) at the area of interest.

Color Flow Mode Top/Sub Menu

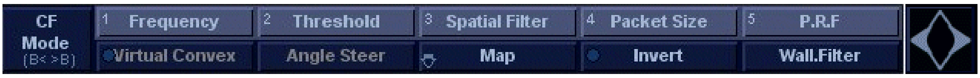
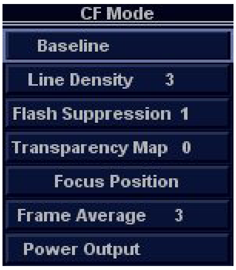

CF
Mode
(B< >B)
1 Frequency
Virtual Convex
2 Threshold
Angle Steer
3 Spatial Filter
Map
4 Packet Size
Invert
5 P.R.F
Wall.Filter

Figure 5-7. Color Flow Mode Top/Sub Menu


CF Mode
Baseline
Line Density 3
Flash Suppression 1
Transparency Map 0
Focus Position
Frame Average 3
Power Output

Dual Purpose Controls

The following share the same controls. Press the control to toggle between functions:

- PRF and Wall Filter
- Color Invert and Packet Size
- Color Map and Frame Average
- Angle Steer and Threshold

Gain

Description	Gain amplifies the overall strength of echoes processed in the Color Flow window or spectral Doppler timeline.
Adjusting	Gain values change depending on the probe and application; they are not associated with a particular position of the button. To decrease/increase Gain, adjust the dial to the left/right.
Values	Values vary by probe, application, and multi frequency setting. Gain displays as dB. Gain values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, New Patient, or Multi Frequency.
Benefits	Allows you to control the amount of color within a vessel or to fill in or clean out spectral information.
Bioeffects	Gain has no affect on Power Output. However, with increased Gain, the power output level can usually be reduced to produce an equivalent image quality.

PRF (Pulse Repetition Frequency)

Description	Increases/decreases the PRF on the color bar.
Adjusting	To raise/lower the velocity scale, press PRF/Wall Filter until you reach PRF, then adjust PRF up/down.
Values	PRF is in kHz. PRF values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.
Benefits	Imaging of higher velocity flow requires increased scale values to avoid aliasing.
Affect on other controls	Changing the PRF may affect Power Output, frame rate, and wall filter. When you adjust the velocity scale, CINE memory is cleared.
Bioeffects	Changing the PRF range may change the TI and/or MI. Observe the output display for possible effects.

Wall Filter

Description	Filters out low flow velocity signals. It helps get rid of motion artifacts caused from breathing and other patient motion.
Adjusting	To raise/lower the wall filter, press ***PRF***/***Wall Filter*** until you reach Wall Filter, then adjust ***Wall Filter*** up/down.
Values	Values vary, depending upon probe, application, and packet size. The wall filter is displayed numerically on the monitor (Hz). Wall Filter values vary by probe and application and are returned to factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or New Patient.
Benefits	Gets rid of excess, unnecessary low frequency signals caused by motion.

Color Scan Area

Description	Color Scan Area sizes and positions the color window.
Adjusting	The window grows from the center of the color flow window. To adjust the size, press **Scan Area** (Size appears in the **Trackball** Status area on the monitor display) then move the Trackball left/ right, up/down. To adjust the position, press **Scan Area** (Pos appears in the Trackball Status area on the monitor display) then move the **Trackball** to position the color window.
Values	Sector and Convex Probes. Ranges from 5 degrees to full B-Mode image. Linear Probe. Ranges from 5mm to full B-Mode image.
Benefits	Increase the color window to see a larger area; decrease the color window to improve frame rate and spatial resolution.
Affect on other controls	The smaller the color window, the faster the frame rate and vice versa.
Bioeffects	Sizing the color window may change the TI and/or MI. Observe the output display for possible effects.

Invert (Color Invert)

Description	Lets you view blood flow from a different perspective, e.g., red away (negative velocities) and blue toward (positive velocities). You can invert a real-time or frozen image.
NOTE:	*Invert reverses the color map, NOT the color PRF.*
Adjusting	To reverse the color flow, press ***Invert (Color Invert)*** . In Triplex, both Color Flow and Doppler Mode velocity scales are inverted.
Values	Invert and non-Invert. Values vary by probe and application. Invert values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.
Benefits	Allows you to view blood flow according to your personal preference, without flipping the probe.

Baseline

Description	Changes the Color Flow or Doppler spectrum baseline to accommodate higher velocity blood flow. Minimizes aliasing by displaying a greater range of forward flow with respect to reverse flow, or vice versa. Baseline adjusts the alias point. The default baseline is at the midpoint of the color display and at the midpoint of the color bar reference display.
Adjusting	To adjust the baseline, adjust ***Baseline*** up/down, as necessary.
Values	Zero velocity follows the baseline. The total PRF range remains the same. Values vary by probe and application. Baseline values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.
Benefits	Unwraps the alias during color flow imaging. Higher velocities can be displayed without reversal of colors.

Color Flow Line Density

Description	Optimizes the Color Flow frame rate or spatial resolution for the best possible color image.
Adjusting	To adjust the line density, select the ***Line Density*** Top/Sub Menu key.
Values	The current frame rate is shown on the Top/Sub Menu. Frame Rate/Resolution values vary by: Probe, Exam Category, Exam Calcs, New Patient, and Frequency. Settings are returned to factory or user preset value when you change any of the above.
Benefits	Low line density is useful in fetal heartbeat, adult cardiac applications, and clinical Radiology applications which require significantly higher frame rates. High resolution is useful in situations where very small vessels are being imaged, e.g., thyroid, testicles.
Affect on other controls	Line density changes the vector density and frame rate.
Bioeffects	Modifying line density may change the TI and/or MI. Observe the output display for possible effects.

Angle Steer

Description	You can slant the ROI of the Color Flow linear image left or right to get more information without moving the probe. The Angle Steer function only applies to linear probes.
Adjusting	To slant the linear image to the left/right, adjust **Angle Steer**.
Values	Linear probes can be steered left (20 degrees), center, or right (20 degrees). Angle Steer values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New patient
Benefits	Provides a Doppler cursor angle suitable for linear probe orientation. Beneficial in Peripheral Vascular to image carotids.
Bioeffects	Activating angle steer may change the TI and/or MI. Observe the output display for possible effects.

Map

Description	Allows you to select a specific color map. After you have made your selection, the color bar displays the resultant map.
Adjusting	After you activate Color Flow, the Color Flow Top/Sub Menu displays. To cycle through available maps, select ***Map***, move the **Trackball** to view available maps, and press **Set** to select.
Values	Velocity Maps (V). Flow shown as blue away/red toward the probe. Velocity Variance Maps (VV). Provides a measure of turbulence (stenosis). Adds green to velocity maps. Power Doppler Imaging Maps (P). PDI Map P7 is used for Directional PDI.
Benefits	Shows the direction of the flow and highlights the higher velocity flows.

Threshold

Description	Threshold assigns the gray scale level at which color information stops.
Adjusting	To increase/decrease the gray scale threshold, select ***Threshold*** left/right.
Values	The settings cycle through various values: 0%-100% of the gray scale. High values display more color; low values displays more B-Mode gray scale data. The Color Threshold level is displayed on the Top/Sub Menu. Values vary by probe and application and are returned to factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or New Patient.
Benefits	Limits color flow overlay to low level echoes inside vessel walls. Helps minimize color `bleeding' outside vessel walls.

Frame Average

Description	Averages color frames.
Adjusting	To smooth temporal averaging, select ***Frame Average***. The selected value displays on the Top/Sub Menu.
Values	Frame Average values vary by probe and application. The values are returned to factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or New Patient.
Benefits	Higher frame averaging keeps the color displayed longer for increased flow visualization while lower frame averaging provides greater flow dynamics.
Affect on other controls	Trades off between frame rate and color quality. As the color quality increases, the frame rate may decrease and as the frame rate increases, the color image quality decreases.

Transparency Map

Description	Brings out the tissue behind the color data.
Adjusting	Select ***Transparency Map*** to adjust
Values	0-4
Benefits	Helps demonstrate the tissues behind the color.

Spatial Filter

Description	Smooths out the color, makes it look less pixely.
Adjusting	Select ***Spatial Filter*** to adjust.
Values	0-5.
Benefits	Smooths the image.

Duplex/Triplex

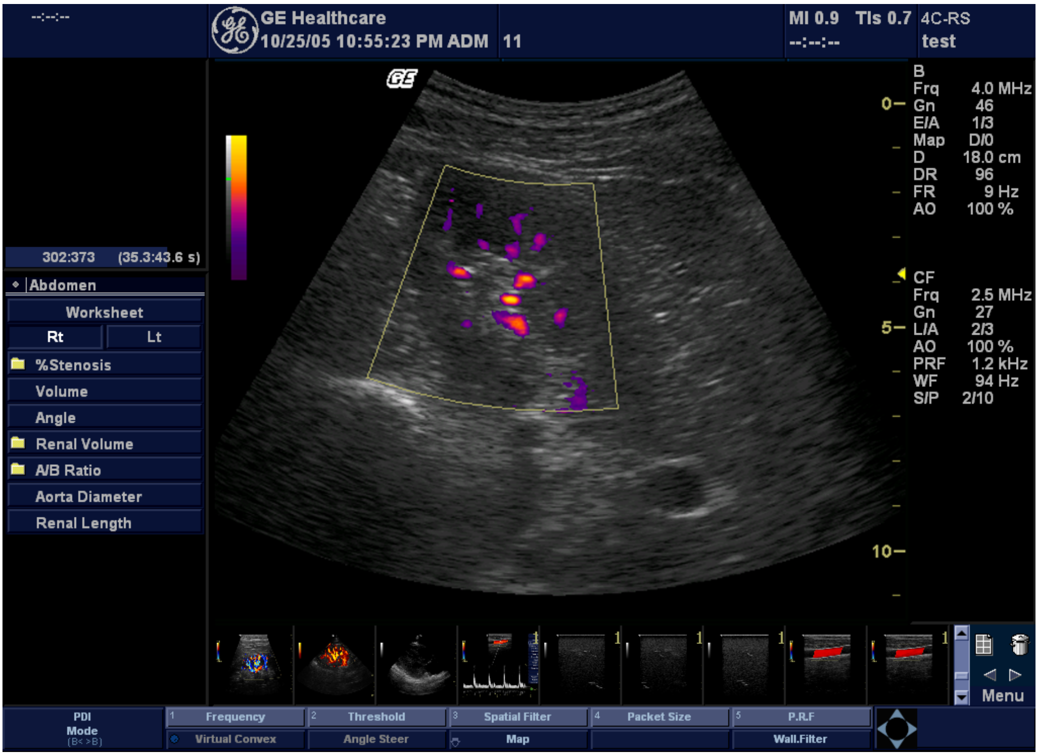
Description	Duplex allows two modes to be active at the same time; Triplex allows three modes to be active at the same time. • B + PW or B + CW or B + CF (Duplex) • B + PW + CF or B + CW + CF (Triplex) B Pause pauses the image while keeping the CW / PW timeline active. When Duplex/Triplex is OFF, either the image or timeline is active. B Pause then switches the active side between the image and the timeline. With Duplex/Triplex active, M/D Cursor functions the same as the Duplex/Triplex control by cycling Duplex/Triplex on/off.
Adjusting	Select ***Duplex/Triplex***.
Preset	You can preset Duplex in Utility --> Imaging --> General.
Benefits	Allows the user to have multiple modes active at the same time.

Packet Size

Description	Controls the number of samples gathered for a single color flow vector.
Adjusting	To increase/decrease the packet size, select ***Packet Size*** left/right.
Values	Values vary by probe and application and are returned to factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or New Patient. Values are displayed on the monitor display as P.
Benefits	Allows you to improve the color sensitivity and accuracy of color averaging (increase packet size) or frame rate (decrease packet size), as needed.
Affect on other controls	When you decrease the packet size, you increase the frame rate at the expense of image quality. When you increase the packet size, you improve image quality at the expense of frame rate.
Bioeffects	Changing packet size may change the TI and/or MI. Observe the output display for possible effects.

Power Doppler Imaging (PDI)

Description Power Doppler Imaging (PDI) is a color flow mapping technique used to map the strength of the Doppler signal coming from the flow rather than the frequency shift of the signal. Using this technique, the ultrasound system plots color flow based on the number of reflectors that are moving, regardless of their velocity. PDI does not map velocity, therefore it is not subject to aliasing.



GE Healthcare
10/25/05 10:55:23 PM ADM 11
MI 0.9 TIs 0.7 4C-RS
test

B
Frq 4.0 MHz
Gn 46
E/A 1/3
Map D/0
D 18.0 cm
DR 96
FR 9 Hz
AO 100 %

CF
Frq 2.5 MHz
Gn 27
L/A 2/3
AO 100 %
PRF 1.2 kHz
WF 94 Hz
S/P 2/10

--:--:--
302:373 (35.3:43.6 s)
Abdomen
Worksheet
Rt
Lt
%Stenosis
Volume
Angle
Renal Volume
A/B Ratio
Aorta Diameter
Renal Length
0
5
10
Menu
PDI Mode (B< >B)
Frequency
Threshold
Spatial Filter
Packet Size
P.R.F
Virtual Convex
Angle Steer
Map
Wall.Filter

Figure 5-8. Power Doppler Imaging Display

Adjusting Press **PDI**. The color flow window appears over the B-Mode image. Move the Trackball to move the CF window. To exit, press **PDI** or select a new mode.

Power Doppler Imaging (PDI) (continued)

Values	On/Off. Twelve power (P0-P6 and P8-P12) and one Directional PDI map (P7) is available.
Benefits	Since PDI does not display velocity, it does not aliase.
Affect on other controls	When PDI is activated, the following controls are adjusted: PRF is set to a lower setting. Color Map is set to a power map. Line Density is adjusted. Wall Filter is set to a lower setting. Threshold is set to 100%. Frame Averaging is adjusted. Packet Size is adjusted.
NOTE:	*These controls are reset to their previous values upon exiting PDI.*
HINTS	When changing maps, higher gain settings may be needed. P-1. The expanded map is designed to expand or increase the dynamic range of data displayed in a PDI image to show both low and high flow states. It is especially useful for highlighting very low flow states just above the noise floor as in renal vessels. P-3. The compressed map is designed to compress or decrease the dynamic range of the PDI image data to highlight high flow states and suppress noise. P-7. Directional PDI displays the direction of flow while in Power Doppler Imaging. Gives all the benefits of PDI while also providing directional information not available in traditional PDI. Used in applications where sensitivity and angle independence is desired, but directional information is also required. Flow towards the transducer is red; flow away is dark blue to light blue.

PDI (Power Doppler Imaging) Mode Top/Sub Menu

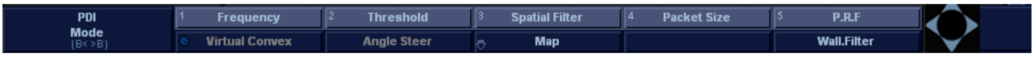
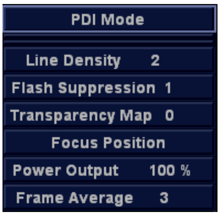

PDI
Mode
(B< >B)
1 Frequency
2 Threshold
3 Spatial Filter
4 Packet Size
5 P.R.F
Virtual Convex
Angle Steer
Map
Wall.Filter

Figure 5-9. PDI Mode Top/Sub Menu


PDI Mode
Focus Position

Line Density 2
Flash Suppression 1
Transparency Map 0
Power Output 100 %
Frame Average 3

NOTE: For more details on the controls, see the Color Flow Mode optimization control descriptions.

Optimizing M Color Flow

M Color Flow Mode

Description	M Color Flow is used for fetal cardiac applications. Color Flow overlays color on the M-Mode image using velocity and variance color maps. The Color Flow wedge overlays the B-Mode image and M-Mode timeline. The Color Flow maps available in M-Mode are the same as in Color Flow Mode. The size and position of the Color Flow window in B-Mode determines the size and position of the Color Flow window in M-Mode. All M-Mode measurements are available with M Color Flow active: depth, distance along a straight line, % stenosis, volume, trace, circumference, enclosed area, distance, time, slope, and heart rate.
Activating	To activate M Color Flow Mode, press M (M-Mode). Then press CF (Color Flow) - or - press CF, then press M. To toggle between M Color Flow controls and Color Flow controls, press the Mode parameters key.
Values	On/Off.
Benefits	Color Flow Mode and Color M-Mode are Doppler Modes intended to add color-coded qualitative information concerning the relative velocity and direction of fluid motion within the B-Mode or M-Mode image.

M Color Flow Mode (continued)

Bioeffects Changing the Sweep Speed, Packet Size, Frame Rate/ Resolution, Zoom, PRF, and ROI size may change the TI and/or MI. Observe the output display for possible effects.

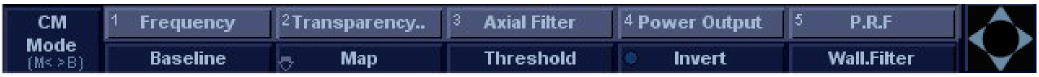
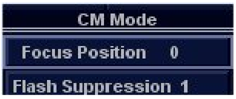

CM
Mode
(M< >B)
1 Frequency
2 Transparency..
3 Axial Filter
4 Power Output
5 P.R.F
Baseline
Map
Threshold
Invert
Wall.Filter

Figure 5-10. M Color Flow


CM Mode
Focus Position 0
Flash Suppression 1

Optimizing Spectral Doppler

Intended Use

Doppler is intended to provide measurement data concerning the velocity of moving tissues and fluids. PW Doppler lets you examine blood flow data selectively from a small region called the sample volume.

Typical Use - PW Doppler

In Pulsed Wave Doppler (PW) Mode, energy is transmitted from the ultrasound probe into the patient, as in B-Mode. However, the received echoes are processed to extract the difference in frequency between the transmitted and received signals. Differences in frequencies can be caused by moving objects in the path of the ultrasound signal, such as moving blood cells. The resultant signals are presented audibly through the system speakers and graphically on the system display. The X axis of the graph represents time while the Y axis represents the shift in frequency. The Y axis can also be calibrated to represent velocity in either a forward or reverse direction.

PW Doppler is typically used for displaying the speed, direction, and spectral content of blood flow at selected anatomical sites. PW Doppler operates in two different modes: conventional PW and High Pulse Repetition Frequency (HPRF).

PW Doppler can be combined with B-Mode for rapidly selecting the anatomical site for PW Doppler examination. The site where PW Doppler data is derived appears graphically on the B-Mode image (Sample Volume Gate). The sample volume gate can be moved anywhere within the B-Mode image.

Typical exam protocol

A typical examination using PW Doppler Mode might proceed as follows:

1. Connect the appropriate probe, leaving the probes in their respective holders.
2. Position the patient for the examination.
3. Press **Patient**. Enter the appropriate patient data using the appropriate exam category.
4. Select the preset, application and probe to be used.
5. Locate the anatomy to be examined. Get a good B Mode image. Press CF to help locate the vessel you wish to examine.
6. Press **M/D Cursor** to display the sample volume cursor and gate.

   or

   Press **PW**. The PW Doppler spectrum appears and the system operates in combined B+Doppler Mode. Adjust **Volume** to adjust Doppler audio. The Doppler signal is heard through the speakers.
7. Position the sample volume cursor by moving the **Trackball** left and right. Position the sample volume gate by moving the **Trackball** up and down. Size the gate by clicking **SV Length**.
8. Optimize the PW Doppler spectrum, as necessary. Refer to the *Doppler Optimization* section of this chapter for more information.
9. Press **B Pause** to toggle between real time B-Mode with Doppler Mode (with audio).
10. Sample along the whole length of the vessel. Make sure that the probe is parallel to flow. Listen, then look, when positioning the sample volume cursor.
11. Press **Freeze** to hold the trace in memory and stop imaging. Activate CINE Timeline, as necessary. See ‘Activating CINE’ on *page 6-7 for more information.*
12. Perform measurements and calculations, as necessary. Refer to the Measurements and Calculations chapter for more information.

Typical exam protocol (continued)

13. Record results by pressing the appropriate print key, depending on the setup of your recording devices.
14. Press **Freeze** to resume imaging.
15. Repeat the above procedure until all relevant flow sites have been examined.
16. Replace the probe in its respective holder.

Activating Doppler Mode

To activate PW Doppler Mode, press PW.

The Doppler spectrum displays along with the B-Mode image. The cursor changes to a Doppler cursor.

You can now position and size the sample volume gate to get a velocity. Use Doppler Audio to listen for when the sample volume gate is positioned over an area of flow.

B Pause toggles between real time B-Mode with Doppler Mode and real time spectral display.

Use Doppler is used to examine blood flow information.

To exit PW Doppler Mode, press PW.

Activating Triplex Mode

To activate Triplex Mode, press CF. Press PW.

The Doppler spectrum displays along with the Color Flow and B-Mode image. The cursor changes to a Doppler cursor.

You can now position and size the sample volume gate to get a velocity. Use Doppler Audio to listen for when the sample volume gate is positioned over an area of flow.

Use Triplex Mode is used to examine blood flow information.

To Exit PW Doppler Mode, press CF, then PW.

Spectral Doppler Display

Time zero (the start of the trace) appears on the left side of the graph. As time progresses, the trace moves to the right. The baseline of the graph (representing zero velocity, zero frequency shift, or no detected flow), appears as a solid line running horizontally across the display. By convention, movement toward the probe is positive and movement away from the probe is negative. Positive frequencies or velocities appear above the baseline. Negative frequencies or velocities appear below the baseline.

Typically, blood flow is not uniform but is composed of a mix of blood cells moving at different velocities and in different directions. Thus, the display is composed of a spectrum as gray scale values. Strong signals are displayed as bright while weak signals are displayed as varying shades of gray.

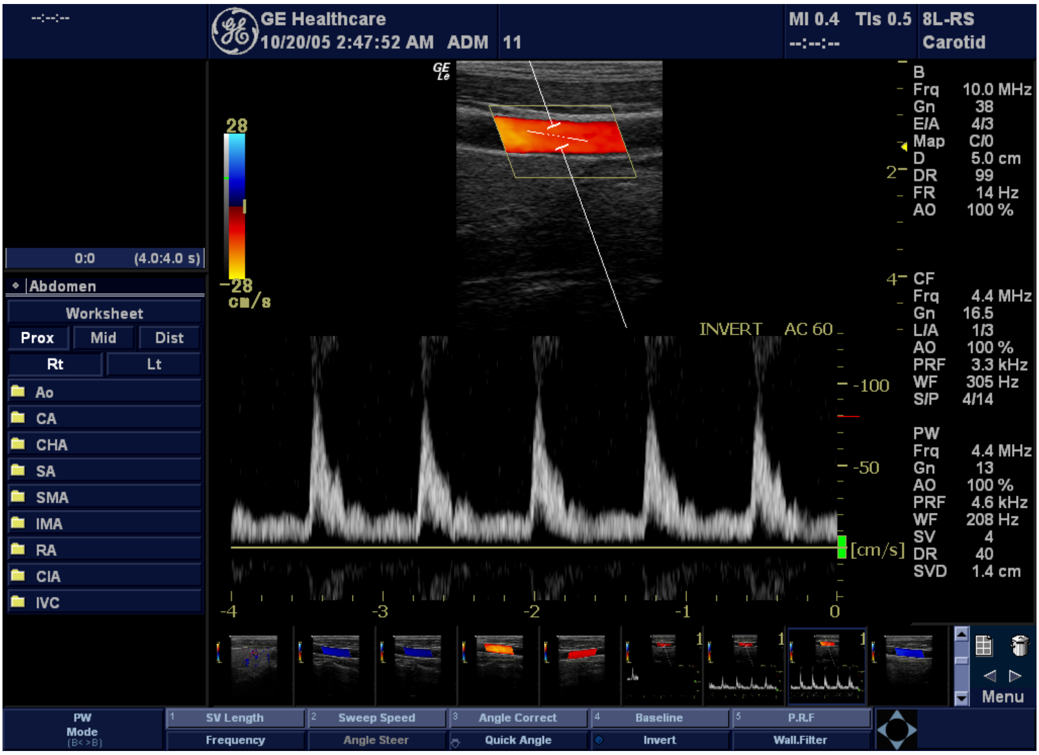
HPRF (High Pulse Repitition Frequency) is invoked when you are operating in PW Doppler Mode and conditions activate HPRF (when the velocity scale factor or sample volume gate depth exceeds certain limits). When HPRF is active, multiple sample volume gates appear along the Doppler mode cursor. Doppler information can be received from any of the multiple sample volume gates. The Doppler signals from all the gates are added together and displayed in one spectrum.

Information about the PW Doppler display is automatically written on the screen and updated when scanning parameters are changed.

This chapter includes:

- A discussion of PW Doppler.
- Activating Pulsed Wave Doppler.
- Optimizing the Doppler spectrum.

Doppler Mode Display



GE Healthcare
10/20/05 2:47:52 AM ADM 11
MI 0.4 TIs 0.5 8L-RS
Carotid

B
Frq 10.0 MHz
Gn 38
E/A 4/3
Map C/0
D 5.0 cm
DR 99
FR 14 Hz
AO 100 %

CF
Frq 4.4 MHz
Gn 16.5
L/A 1/3
AO 100 %
PRF 3.3 kHz
WF 305 Hz
S/P 4/14

PW
Frq 4.4 MHz
Gn 13
AO 100 %
PRF 4.6 kHz
WF 208 Hz
SV 4
DR 40
SVD 1.4 cm

INVERT AC 60

--:--:--
0:0 (4.0:4.0 s)
Abdomen
Worksheet
Prox
Mid
Dist
Rt
Lt
Ao
CA
CHA
SA
SMA
IMA
RA
CIA
IVC
28
-28
cm/s
2
4
-100
-50
[cm/s]
-4
-3
-2
-1
0
Menu
PW Mode
SV Length
Sweep Speed
Angle Correct
Baseline
P.R.F
Frequency
Angle Steer
Quick Angle
Invert
Wall.Filter

Figure 5-11. Doppler Mode Display

Table 5-1: Doppler Mode Display Explanations

Doppler Display	Description, Format, Values
PRF	Pulse repetition frequency, displayed as PRF in kHz.
Wall Filter	Wall filter size, displayed as WF in Hz.
Doppler Gain*	Displays as GN in decibels (dB).
Sample Volume Depth	Displays (in Cm) when Doppler cursor is present.
Doppler Angle (AC ##)	Indicates angle in degrees between the Doppler mode cursor and the angle correction indicator. Displays when Doppler cursor is present. The Doppler Angle displays in red when the angle exceeds 60°. Velocities obtained when the angle is greater than 80° are displayed as asterisks (***).
Spectral Invert	INVERT appears when the spectral trace is inverted and the plus/minus signs (+/-) are reversed.

Table 5-1: Doppler Mode Display Explanations

Doppler Display	Description, Format, Values
HPRF	HPRF mode is used when detected velocities exceed the processing capabilities of the currently selected PW Doppler scale or when the selected anatomical site is too deep for the selected PW Doppler scale.
Time Scale	Each selection represents a different sweep time.
Angle Correct	Indicates flow direction.
Sample Volume Gate	Indicates sample volume box. Each probe defaults to a specific range gate.
Doppler Velocity Scale	Flow direction has a positive and negative indicator, noted in centimeters per second (cm/sec). When the velocity scale is less than 10 cm/s, it is displayed to the first decimal point (4.6 rather than 5 cm/s). The Doppler velocity scale adjust as you adjust the PRF.

Dual Purpose Controls

The following share the same controls. Press the control to toggle between functions:

- Frequency and SV Length
- PRF and Wall Filter
- Angle Correct and Auto Angle
- Sweep Speed and Angle Steer
- Baseline and Spectral Invert

Doppler Mode Scanning Hints

HINTS

The best Doppler data is collected when parallel to flow, with orientation also parallel to the anatomic target; whereas, the best B-Mode image data is collected perpendicular to the anatomic target. Therefore, you don't usually get both an ideal B-Mode image and ideal Doppler data simultaneously.

Control overview

Dynamic Range. Affects the amount of Doppler amplitude data displayed.

Wall Filter. Removes the noise caused by vessel or heart wall motion at the expense of low flow sensitivity.

Sweep Speed. Controls speed of spectral update.

Doppler Mode Top/Sub Menu

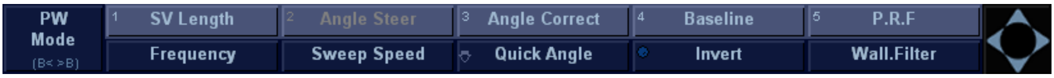
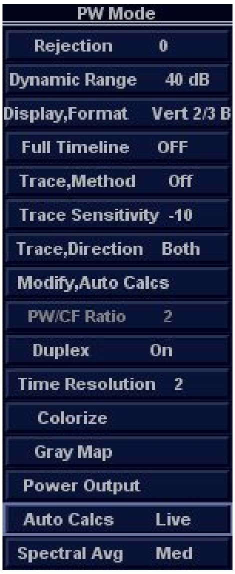

PW
Mode
(B< >B)
1 SV Length
Frequency
2 Angle Steer
Sweep Speed
3 Angle Correct
Quick Angle
4 Baseline
Invert
5 P.R.F
Wall.Filter

Figure 5-12. PW Mode Top/Sub Menu



Rejection 0
Dynamic Range 40 dB
Display,Format Vert 2/3 B
Full Timeline OFF
Trace,Method Off
Trace Sensitivity -10
Trace,Direction Both
Modify,Auto Calcs
PW/CF Ratio 2
Duplex On
Time Resolution 2
Colorize
Gray Map
Power Output
Auto Calcs Live
Spectral Avg Med

B Pause

Description	Toggles between simultaneous and update presentation while viewing the timeline.
Adjusting	To activate, press **B Pause** to toggle between simultaneous and update. Doppler Mode does not restart each time the image is updated; however, a black bar may appear with a lightning bolt signalling a break in the timeline.
Values	On/Off.
Benefits	Update increases the Spectral Doppler display quality.
Bioeffects	Activating Update may change the TI and/or MI. Observe the output display for possible effects.

Doppler Sample Volume Gate Position (Trackball)

Description	Moves the sample volume gate on the B-Mode's Doppler Mode cursor. The gate is positioned over a specific position within the vessel.
Adjusting	To move Doppler Mode cursor position, move **Trackball** left or right until positioned over the vessel. To move sample volume gate position, move **Trackball** up or down until positioned inside the vessel.
Values	Defaults to 50% of the depth and can move continuously throughout the field of view.
Benefits	Positions the sample volume gate to sample blood flow.
Bioeffects	Changing the sample volume gate position may change the TI and/or MI. Observe the output display for possible effects.

Doppler Sample Volume Length

Description	Sizes the sample volume gate.
Adjusting	To increase/decrease the gate size, adjust ***SV Length*** on the Top/Sub Menu. Hold down key to continuously size gate. You can adjust the sample volume gate length whenever the sample volume gate appears on the display. *NOTE: Adjustments to the sample volume gate size are made from the center point of the sample volume position.*
Values	Values vary by probe and application. Sample volume gate size values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.
Benefits	A smaller gate produces accurate sampling results because it is more sensitive. You can also enlarge the gate for sampling large vessels or areas.
Bioeffects	Changing the sample volume gate size may change the TI and/or MI. Observe the output display for possible effects.

PRF

Description

Adjusts the velocity scale to accommodate faster/slower blood flow velocities. Velocity scale determines pulse repetition frequency.

If the sample volume gate range exceeds single gate PRF capability, the system automatically switches to high PRF mode. Multiple gates appear, and HPRF is indicated on the display.

High PRF

High Pulse Repetition Frequency (HPRF) is a special operating mode of PW Doppler. In HPRF mode, multiple energy pulses are used. This allows higher velocities to be detected without causing aliasing artifacts. HPRF mode is used when detected velocities exceed the processing capabilities of the currently selected PW Doppler scale or when the selected anatomical site is too deep for the selected PW Doppler scale. The pulse repetition frequency (PRF) is displayed to the left of the spectrum in frames per second.

NOTE: *Ensure that only one gate overlays a blood vessel at a time. Otherwise, signals from more than one flow area are superimposed.*

Adjusting

To raise/lower, adjust the ***PRF*** on the Top/Sub Menu (PRF and Wall Filter share the same control. Press the control to toggle between PRF and Wall Filter). The display updates velocity scale parameters after you adjust the velocity scale.

Values

Velocity Scale values vary by probe and application. In Triplex, when you change the velocity scale in Color Flow, the Doppler Mode velocity scale is also updated if Triplex is on.

Velocity Scale values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.

PRF (continued)

Benefits	Blood flow information is not cut off due to the effect of aliasing.
Affect on other controls	When you raise the velocity scale, the spectral waveform may decrease in size; when you lower the velocity scale, the spectral waveform may increase in size. Changes in the spectrum are relative to changes in the velocity scale, that is, it sizes accordingly. When you adjust the velocity scale, CINE memory is cleared. Adjustments may affect sample volume size and Doppler wall filter.
Bioeffects	Changing the velocity range may change the TI and/or MI. Observe the output display for possible effects.

Angle Correct

Description	Estimates the flow velocity in a direction at an angle to the Doppler vector by computing the angle between the Doppler vector and the flow to be measured.
NOTE:	*When the Doppler Mode Cursor and angle correct indicator are aligned (the angle is O), you cannot see the angle correct indicator.*
Adjusting	Flow toward the probe is mapped above the baseline and vice versa. To adjust the angle relative to the probe face, adjust ***Angle Correct*** to the left/right. The velocity scale changes when you adjust angle correct.
Values	1 increments from 0 to 90. The possible range of operation is from 0 degrees to 90 degrees in either direction. For optimum velocity measurements, the angle of incidence should be between 45-60 for vascular applications. Angle Correct values vary by probe and application. Angle Correct values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.
Benefits	Optimizes the accuracy of the flow velocity. This is especially useful in vascular applications where you need to measure velocity.

Quick Angle

Description	Quickly adjusts the angle by 60 degrees.
Adjusting	To quickly adjust the angle, press ***Quick Angle***.
Values	0 degrees and 60 degrees.

Wall Filter

Description	Insulates the Doppler signal from excessive noise caused from vessel movement.
Adjusting	To increase/decrease, select ***Wall Filter***, then adjust ***Wall Filter*** on the Top/Sub Menu (PRF and Wall Filter share the same control. Press the control to toggle between PRF and Wall Filter). Each adjustment cycles you to the next setting.
Values	Values vary, depending upon the probe and application. The current value displays on the Top/Sub Menu and the monitor. Wall Filter values are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, New Patient.
Benefits	Gets rid of excess, unnecessary information. Cleans out low level noise above and below the baseline so you don't see or hear it on the spectrum.
Affect on other controls	Wall filter may be changed by changes to the velocity scale.

Baseline

Description	Adjusts the baseline to accommodate faster or slower blood flows to eliminate aliasing.
Adjusting	Baseline adjusts the point in the spectrum where the velocity trace is at zero. The default baseline is at the midpoint of the spectrum. To shift the baseline, adjust ***Baseline*** on the Top/Sub Menu. The baseline displays as a solid line running across the spectrum. The baseline is raised and lowered in equal increments, depending on the current Doppler scale factor. The control does not wrap when the maximum baseline shift (in either direction) has been reached.
Values	5% increments, with 0 being the center of the display and +100% being the top edge of the display and 0% being the bottom edge of the display. Baseline values vary by probe and application and are returned to the factory or user preset value when you change: Probe, Exam Category, Exam Calcs, or New Patient.
Benefits	Unwraps the alias. Rearranges the velocity scale without changing the velocity scale. Readjusts the positive and negative velocities limit without changing the total velocity range.

M/D Cursor

Description	Displays the Doppler Mode cursor on the B-Mode image.
Adjusting	To activate/deactivate the Doppler Mode cursor, press M/D Cursor. Trackball to position sample volume graphic. The M/D Cursor key backlights.
Values	On/Off.
Benefits	Lets you position the cursor before you go into Doppler Mode.

Invert

Description	Vertically inverts the spectral trace without affecting the baseline position.
Adjusting	To invert the spectral trace, press ***Invert***. The plus (+) and minus (-) signs on the velocity scale reverse when the spectrum is inverted.
	Positive velocities display below the baseline.
Values	Forward/reverse. The trace corresponds to flow direction (positive flow is forward flow toward the probe or negative flow is reverse flow away from the probe). The invert setting is returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient. In Triplex, both Color Flow and Doppler Mode velocity scales are inverted.
Benefits	If you change the probe angle to accommodate anatomy, blood flow still moves in the same direction, but the Doppler information will be reversed. It is easier in cases like this to invert the spectrum instead of reversing the probe orientation.

Cycles to Average

Description	The average value over a number of cycles (from 1-5). For example, if you set the number of cycles at 3, values would be averaged for 3 cycles. If you have 5 cycles on the display, the PS would be the average of 3 of the 5 cycles, which are identified by a line drawn over the 3 averaged cycles.
Values	1-5, available for live and frozen images.

Dynamic Range (Compression)

Description	Dynamic range controls how echo intensities are converted to shades of gray, thereby increasing the range of contrast you can adjust.
Adjusting	You access Doppler dynamic range from the Doppler Mode Top/Sub Menu. Each click cycles you to the next setting. To increase/decrease, press ***Dynamic Range***.
Values	The settings cycle in 4 dB increments. The current value displays on the Top/Sub Menu. Dynamic Range values vary by probe and application and are returned to the factory or user preset value when you change the following: Probe, Exam Category, Exam Calcs, or New Patient.
Benefits	Optimizes the image's texture and smoothness by increasing or decreasing the amount of gray scale.
Affect on other controls	Dynamic range operates only in realtime; Compression is available while frozen, in CINE, or CINE Timeline.

Spectral Trace (Trace Method)

Description	Traces the average mean and peak velocities in realtime or frozen images.
Adjusting	Select the spectral trace method from ***Trace Method***. To activate the Spectral Trace Top/Sub Menu, press To get a peak trace, click MAX TRACE. A green trace displays on the spectrum. To get a mean trace, click MEAN TRACE. A blue trace displays on the spectrum.
Selecting Trace Position	Trace direction key lets you trace the cardiac cycle in the timeline above, below, or above and below (composite) the baseline.
Benefits	Lets you trace the cardiac cycle.

Trace Sensitivity

Description	Adjust the trace to follow the waveform for signal strength.
Adjusting	Select the appropriate Top/Sub Menu control to adjust the value.
Values	From -10 to 10.
Benefits	If the signal is very faint, increasing the Trace Sensitivity will allow the system to trace that signal strength.

PW/CF Ratio

Description	Active when “Dependent Triplex” is on in triplex mode. Used to set the PRF ratio between PW and CFM.
Adjusting	Select ***PW/CF Ratio*** to select the ratio.
NOTE:	*Set “Dependent Triplex” to the on position at the Utility -> Imaging -> PW menu before using this feature.*
Values	1–CFM and PW PRF are the same
	2–PW PRF is twice the CFM
	4–PW PRF is four time the CFM
Benefits	Optimizes PW PRF in Triplex mode. Decrease aliasing without changing PRF or CFM.

Trace Direction

Description	Specifies trace direction.
Adjusting	Select ***Trace Direction***.
Values	Above, Below, or Both.
Benefits	You can select where on the waveform to perform the trace, above, below, or both.

Full Timeline

Description	Expands display to full timeline display.
Adjusting	Select ***Full Timeline***.
Values	On/Off.
Benefits	Allows you to view just the timeline, to see more detail.

Display Format

Description	Changes the horizontal/vertical layout between B-Mode and M-Mode, or timeline only.
Adjusting	Select ***Display Format***.
Values	Vertical 1/3, 1/2, or 2/3 B-Mode, Horizontal 1/4 or 1/2 B-Mode, or Timeline Only.
Benefits	You can select how to have your Doppler timeline and anatomy displayed.

Time Resolution

Description	Adjusts image appearance so that if you select a lower setting, the image appears smoother; if you select a higher setting, the image appears sharper.
Adjusting	Select ***Time Resolution***.
Values	1-3
Benefits	Time Resolution = 3 (high) smooths the Timeline; Time Resolution =1 (low) increases the time resolution (sharpens the image).

Spectral Average

Description	Averages the spectrum in a vertical direction and timeline direction
Adjusting	Select ***Spectral Aver.*** to select the values.
Values	Off, Low, Med (Medium), High and Very High.
Benefits	This has the effect of presenting a smoother and softer image.

Modify Auto Calcs

Description	Activates the menu to select which calculations are automatically calculated.
Adjusting	Select ***Modify Auto Calcs*** to activate Modify Auto Calcs Top/Sub Menu.
Benefits	Provides flexibility.

Auto Calcs

Description	Activates the calculation automatically which you select in the Modify Auto Calculation when the system is in a state of freeze or live.
Adjusting	Select the appropriate Top/Sub Menu control to adjust the value.
Values	• Live: Auto calculation activates when the system in a state of live. • Freeze: Auto calculation activates when you press Freeze. • Off

Continuous Wave Doppler (CWD)

Allows examination of blood flow data all along the Doppler Mode cursor rather than from any specific depth. Gather samples along the entire Doppler beam for rapid scanning of the heart. Range gated CW allows information to be gathered at higher velocities.

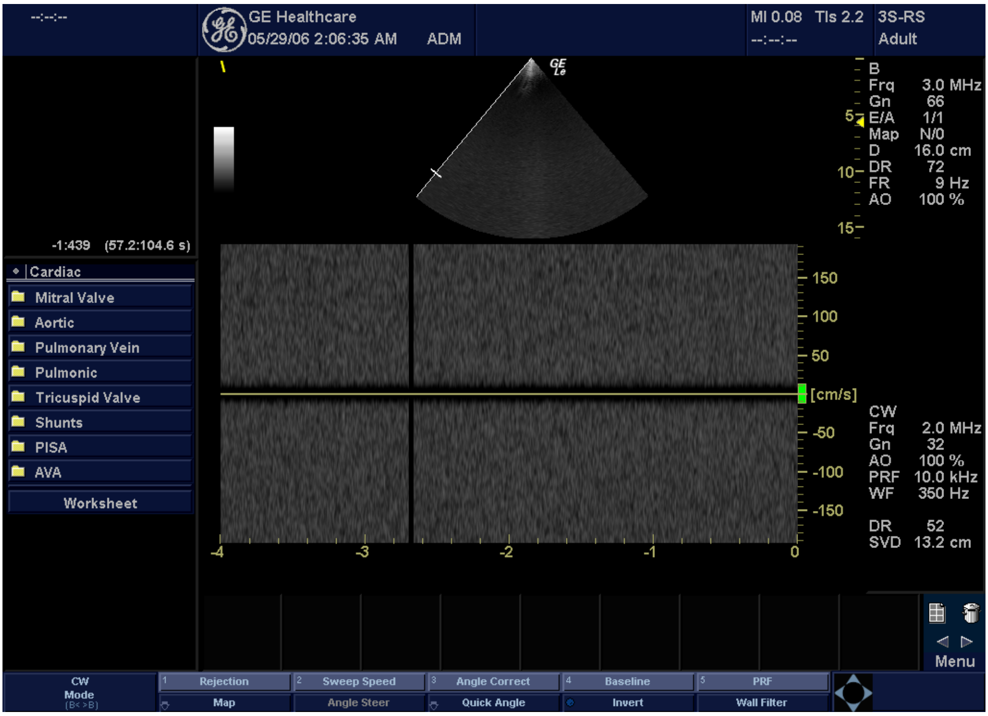
Works with the 3S-RS probe.

Activating CW Doppler

To activate CW Doppler Mode:

- Ensure that the appropriate CW probe is connected.
- Press **F6** on the keyboard to enter CW mode. F6 is the predefined function key for CW, found on the Utility -> Admin -> Function Key preset menu.

The Doppler Spectrum appears, along with the CW Top/Sub Menu Menu.


--:--:--
GE Healthcare
05/29/06 2:06:35 AM ADM
MI 0.08 TIs 2.2 3S-RS
--:--:-- Adult

B
Frq 3.0 MHz
Gn 66
E/A 1/1
Map N/0
D 16.0 cm
DR 72
FR 9 Hz
AO 100 %

-1:439 (57.2:104.6 s)

CW
Frq 2.0 MHz
Gn 32
AO 100 %
PRF 10.0 kHz
WF 350 Hz
DR 52
SVD 13.2 cm

Cardiac
Mitral Valve
Aortic
Pulmonary Vein
Pulmonic
Tricuspid Valve
Shunts
PISA
AVA
Worksheet
5
10
15
150
100
50
[cm/s]
-50
-100
-150
-4
-3
-2
-1
0
Menu
CW Mode (B< >B)
Rejection
Map
Sweep Speed
Angle Steer
Angle Correct
Quick Angle
Baseline
Invert
PRF
Wall Filter

Figure 5-13. CWD Screen

The following CW parameters are displayed: Frequency, Gain, Acoustic Output, Scale, Low Vel Reject and Dynamic Range.

Exiting CW Doppler

CW Doppler Mode, press **F6**.

Using 3D

Overview

WARNING

DO NOT scan any pacemaker patient using the sensor device. The magnetic fields emitted from the device may interfere with the pacemaker operation.

Table 5-2: 3D Package Option

3D Type	Description	Sensor/ No Sensor	Available Tabs
Easy 3D	Designed for rendering B Mode images, e.g., Baby Face scans.	No sensor	3D Acquisition, Easy 3D, Movie

3D Acquisition

Acquiring a 3D Scan

To acquire a 3D scan,

1. Optimize the B-Mode image. Ensure even gel coverage.
2. Press the 3D control panel key. Two screens appear.

NOTE: *Set appropriate values for Acq Mode and Scan Plane. Also, set the scan distance before scanning.*

3. To start acquiring the image, press ‘L’ (the left split screen key).
4. To perform a parallel scan, scan evenly. To perform a sweep (fan) scan, rock the probe once. Note the distance of the scan.
5. The 3D volume of interest (VOI) is dynamically assembled on the right side of the screen.

NOTE: *If the image stops before you’re done scanning, start acquiring the 3D volume of interest again.*

6. To complete the 3D scan, press ‘R’ (the right split screen key).

NOTE: *You can also press Freeze, but then you need to also press the 3D key to obtain the final render.*

3D Notes

- Adjust the 3D dataset brightness with B-Mode or Color Flow Mode Gain.
- Use Colorize to change the color of the active dataset.
- Use Zoom to increase the zoom factor of the active dataset.
- Vertical lines may be seen in a resliced image. This usually happens when you scan too fast or if the scan distance is set to a high value.

  Scan more slowly, adjust the frame rate for a faster rate or adjust the scan distance.

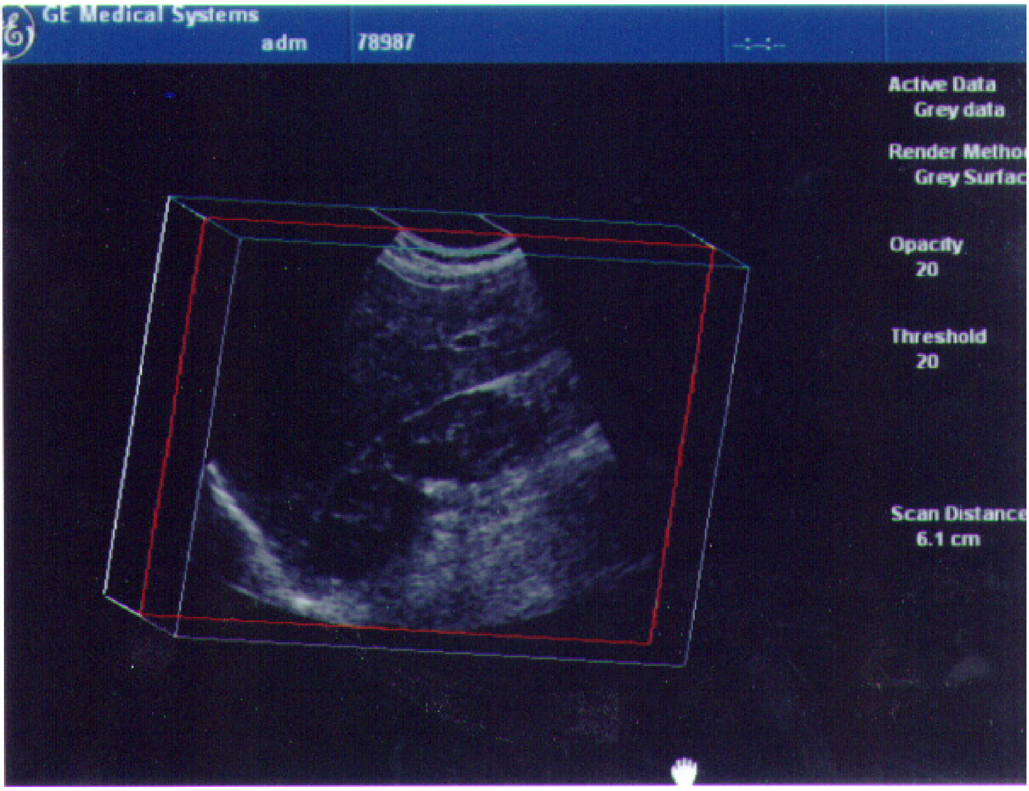
Manipulating the Volume of Interest

Imagine you are able to manipulate the 3D volume of interest (VOI) in your hand. The 3D VOI is a tangible anatomical object that you can see and manipulate easily using the Trackball and Set control panel keys.

Practice positioning the pointer at different places within the 3D VOI. Highlight different colors (white, red, yellow, or green). Press Set to select a VOI for manipulation. Use the hand to manipulate the 3D VOI.

Rotating the 3D VOI Left/Right or Forward/Backward

You can rotate it left to right or right to left. You can rotate it forward/backward. Press right Set key when the white pointer finger is positioned on the white box. Move the closed white hand to manipulate the 3D VOI.



Active Data
Grey data

Render Metho
Grey Surfac

Opacity
20

Threshold
20

Scan Distance
6.1 cm

Figure 5-14. Manipulating the 3D Volume of Interest (White Hand)

Moving Through the 3D VOI

You can move through the 3D VOI using the red hand. Press Set when the red pointer finger is positioned on the red box. Move the closed red hand to move through the 3D VOI.

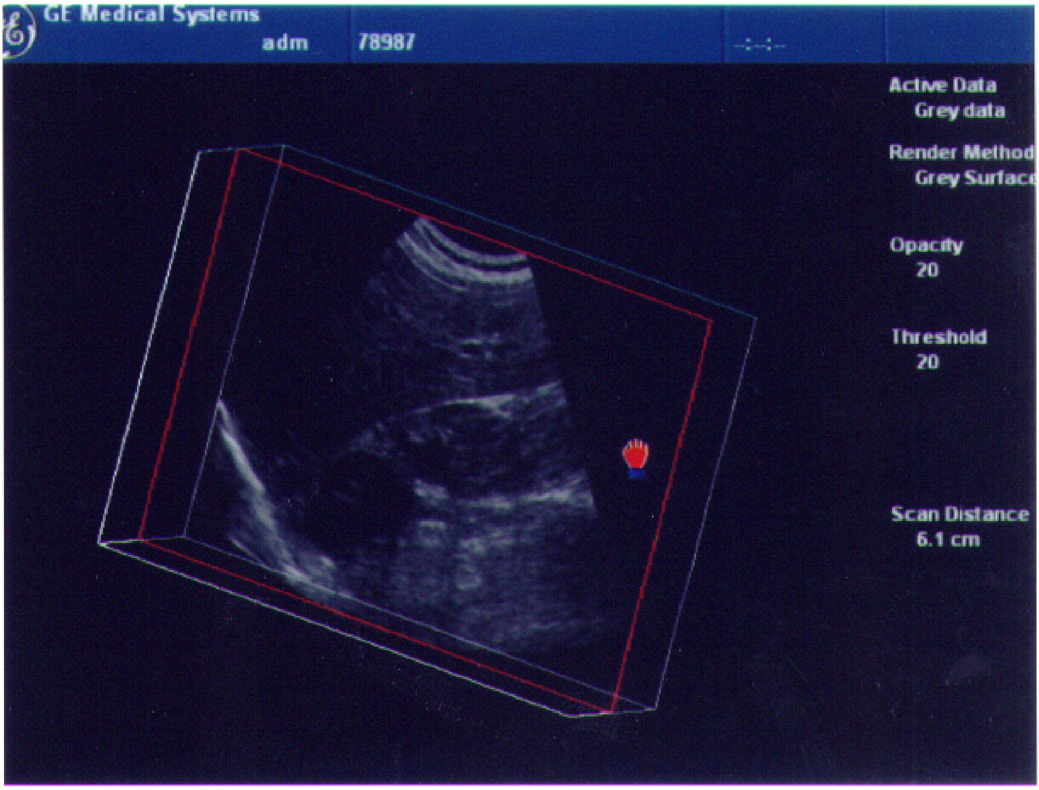

GE Medical Systems
adm
78987
Active Data
Grey data
Render Method
Grey Surface
Opacity
20
Threshold
20
Scan Distance
6.1 cm

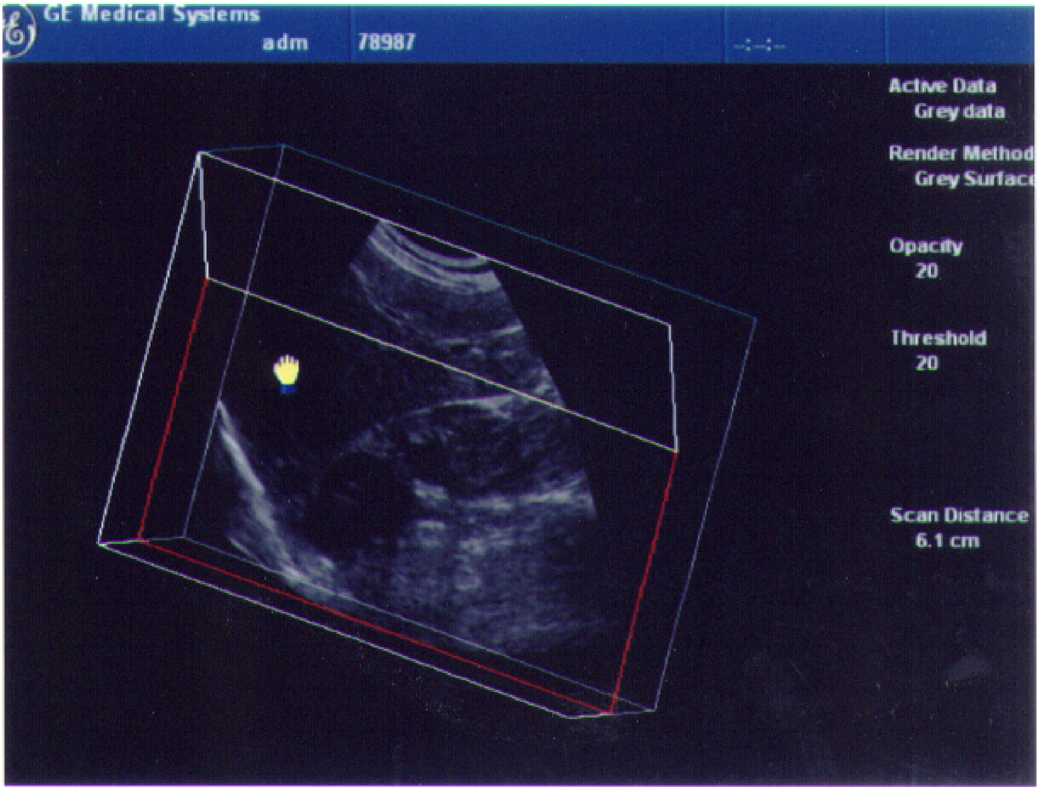
Figure 5-15. Moving through a 3D Volume of Interest (Red Hand)

NOTE: *Any plane in the volume can be made active (highlighted with red box) by clicking on it.*

Viewing Specific Portions of the Anatomy

You can pull back tissue to view specific portions of anatomy using the yellow hand. Press Set when the yellow pointer finger is positioned on the yellow box. Move the closed yellow hand to manipulate the 3D VOI.

NOTE: *This actually moves an edge. A yellow hand appears only when the pointer is on an edge of the VOI.*



Active Data
Grey data

Render Method
Grey Surfac

Opacity
20

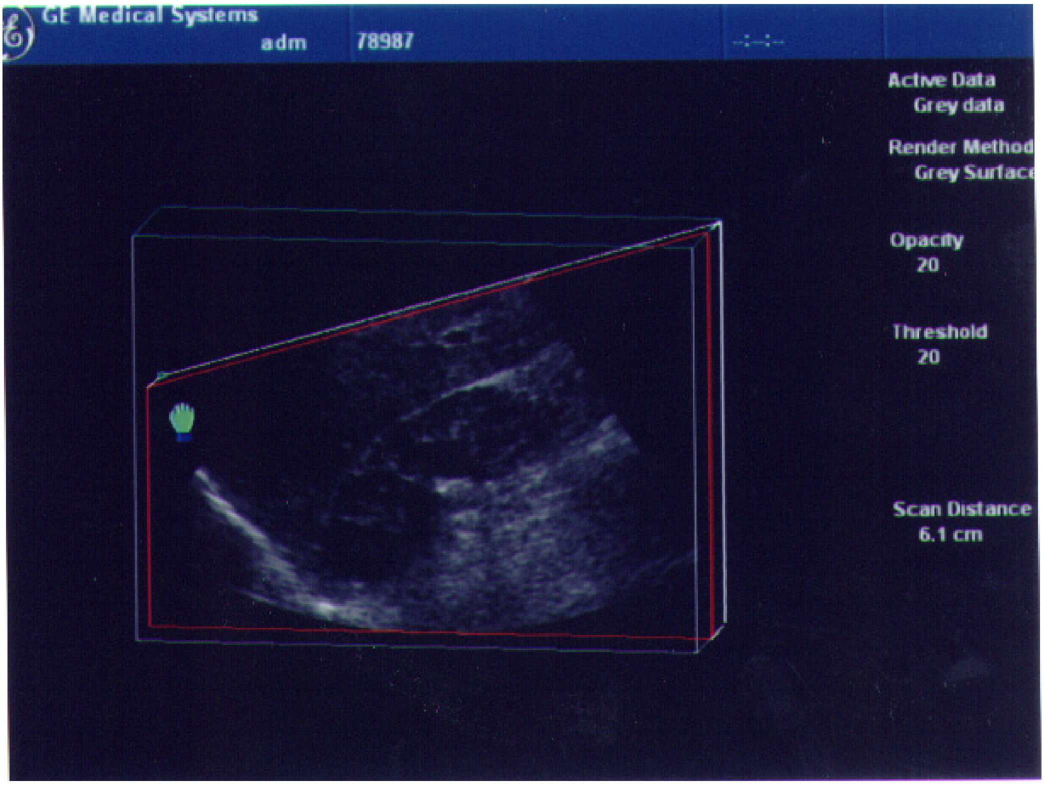
Threshold
20

Scan Distance
6.1 cm

Figure 5-16. Manipulating the Edge of a 3D Volume of Interest (Yellow Hand)

Pulling Back a Corner of the VOI to View Specific Anatomy

You can pull back a corner to view specific portions of anatomy using the green hand. Press Set when the green pointer finger is positioned on the green box. Move the closed green hand to manipulate the 3D VOI.



Active Data
Grey data

Render Method
Grey Surface

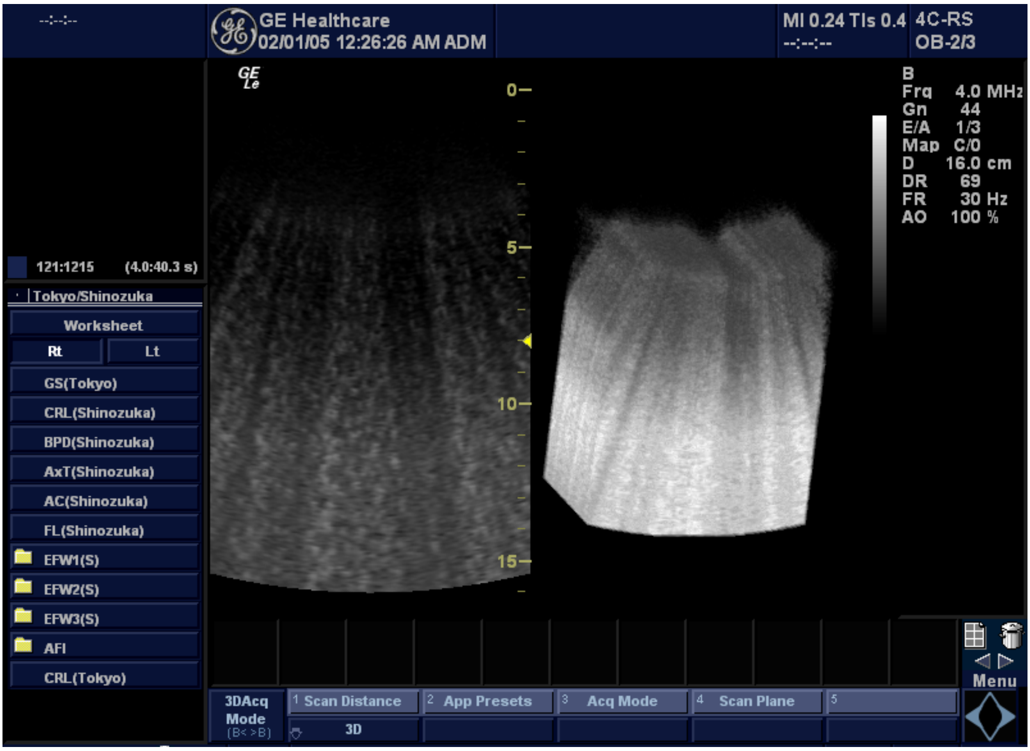
Opacity
20

Threshold
20

Scan Distance
6.1 cm

Figure 5-17. Manipulating a Corner of the 3D Volume of Interest (Green Hand)

3D Acquisition Parameter Description


GE Healthcare
02/01/05 12:26:26 AM ADM
MI 0.24 TIs 0.4
4C-RS
OB-2/3
121:1215 (4.0:40.3 s)
Tokyo/Shinozuka
Worksheet
Rt
Lt
GS(Tokyo)
CRL(Shinozuka)
BPD(Shinozuka)
AxT(Shinozuka)
AC(Shinozuka)
FL(Shinozuka)
EFW1(S)
EFW2(S)
EFW3(S)
AFI
CRL(Tokyo)
0
5
10
15
Menu
3DAcq Mode (B<>B)
1 Scan Distance
2 App Presets
3 Acq Mode
4 Scan Plane
5
3D

B
Frq 4.0 MHz
Gn 44
E/A 1/3
Map C/0
D 16.0 cm
DR 69
FR 30 Hz
AO 100 %

Figure 5-18. 3D Acquisition

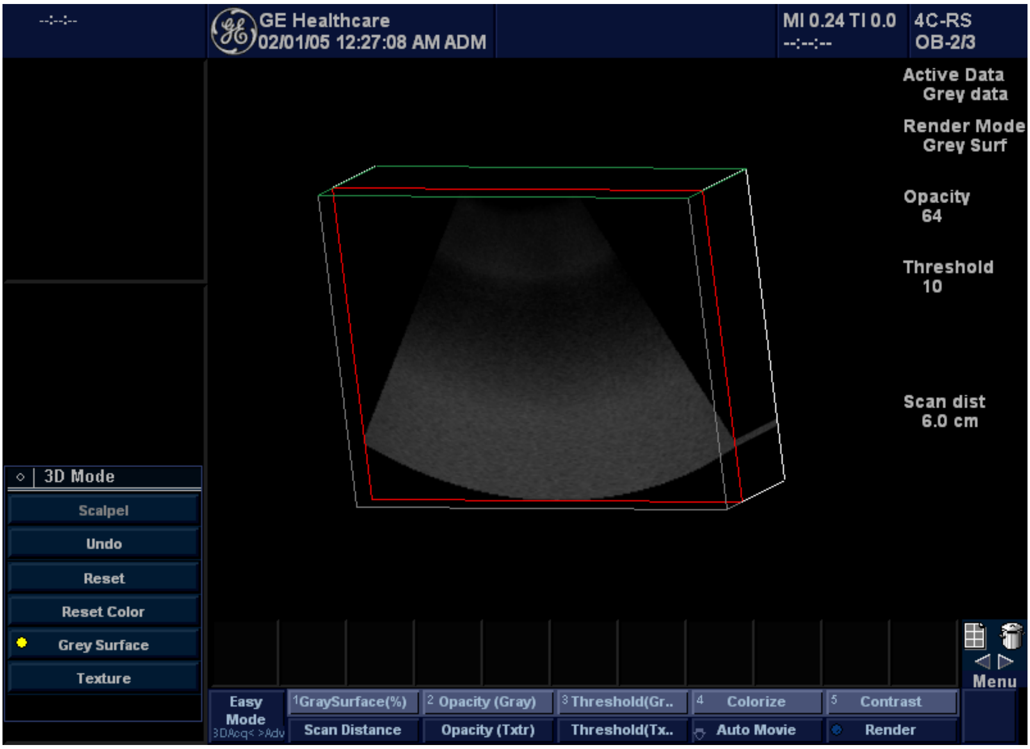
Table 5-3: 3D Acquisition Description and Instructions for Use

3D Parameter	Description
Application Presets	Selections: None, OB - Baby Face, Vascular **None**. No application preset applied. **OB - Baby Face.** After having scanned in this mode, certain rendering parameters are set automatically. The gray surface mode is activated and the texture mode is switched off. The gray surface mode values for opacity and threshold are set automatically according to the datasets histogram. **Vascular**. Available only with Tru 3D package. After having scanned in this mode, certain rendering parameters are set automatically. The color image is rendered in the texture mode. The values for opacity and threshold of the texture mode are set automatically according to the datasets histogram. The B-Mode image is rendered in the gray surface mode. Opacity and threshold values are defined according to the histogram.

Table 5-3: 3D Acquisition Description and Instructions for Use

3D Parameter	Description
Acquisition Mode	Selections: Sensorless Parallel, Sensorless Sweep **Sensorless Parallel**. In this mode the probe must be moved during 3D data acquisition without angling it. You should scan the object you want to render in 2-4 seconds. The speed at which you scan should be constant. No sensor is mounted on the probe. • Since the time for post-processing depends on the acquired number of frames, it is recommended that you check the frame rate. Low frame rates result in fewer acquired frames for the 3D dataset which results in intensive post-processing (interpolation). Therefore, low frame rate = long post-processing. **Sensorless Sweep**. In this mode the probe must be moved to a position where you can clearly see a middle cut of the object you want to scan and render. Tilt the probe to about 30 degrees until the object you want to scan disappears. Start the acquisition and tilt the probe over a distance of around 60 degrees until the object disappears again. The entire scan time should be around 2-4 seconds. During the sweep, the probe may not be moved parallel, just tilted. No sensor is mounted on the probe. Before starting an acquisition, take care that the transmitter is positioned correctly during data acquisition and that the transmitter cannot move.
Scan Plane	Selections: Front to Back, Side to Side **Front to Back**. After having scanned in this mode, the rendered dataset is shown in a frontal view. For acquiring a fetal face in sagittal cuts, use this mode. **Side to Side**. After having scanned in this mode, the rendered dataset is shown from a side view. For acquiring a fetal face in coronal cuts, use this mode.
3D	Starts the rendering process.
Scan Distance	Adjusts the distance covered during the scan. Depending on the real width of a scan acquired during a sensorless 3D acquisition, the volume of interest's width can be enlarged or reduced. You can adapt the form of a fetal face if the baby's head looks oval instead of round. The assumed default width of a parallel scan is 6 cm; of a fan scan 60 degrees.

Easy 3D


--:--:--
GE Healthcare
02/01/05 12:27:08 AM ADM
MI 0.24 TI 0.0
4C-RS
OB-2/3
3D Mode
Scalpel
Undo
Reset
Reset Color
Grey Surface
Texture
Easy Mode
3DAcq< >Adv
1 GraySurface(%)
2 Opacity (Gray)
3 Threshold(Gr..
4 Colorize
5 Contrast
Scan Distance
Opacity (Txtr)
Threshold(Tx..
Auto Movie
Render
Menu

Active Data
Grey data

Render Mode
Grey Surf

Opacity
64

Threshold
10

Scan dist
6.0 cm

Figure 5-19. Easy 3D

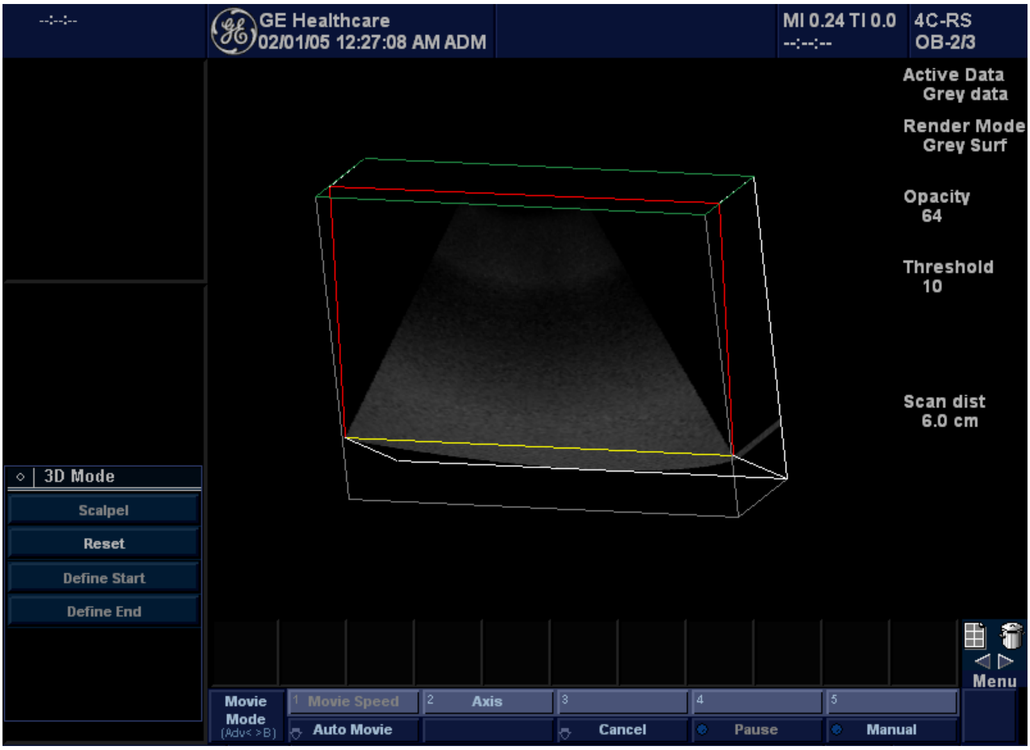
Table 5-4: Easy 3D Description and Instructions for Use

3D Parameter	Description
Reset	Resets the 3D volume of interest back to its original orientation.
Utilities	Select Average Off, Average Light, Average Medium, or Average Strong.
Undo	Undoes any manipulation you have done to your 3D dataset.
Auto Movie	Initializes the calculation and display of a 3D movie. A rotation of 30 degrees left and right around the actual image position (either the default position after acquisition or the position that was manually defined by manipulating the 3D volume of interest) is shown. For this 60 degree rotation, eleven images in steps of 6 degrees are calculated.

Table 5-4: Easy 3D Description and Instructions for Use

3D Parameter	Description
Scalpel	Structures, for example a part of the placenta hiding the view to a fetal face, can be cut out in a rendered image. All visible structures can be cut out. The option of 'erase inside' deletes all structures inside the marked region. The option of 'erase outside' deletes all structures outside the marked region. The region in the rendered image is marked with the right Set key. To define the contour of the region, press the right Set key for each vertex. To close the contour, double click the right Set key. As long as a contour is not closed, it can be traced back with the left Set key. The cut out process can be undone by the Undo Last function. As soon as the Apply button is pressed, a new dataset is generated.
Gray Surface	Activates the gray surface rendering mode. It leads to a transparent appearance of the object, generated by displaying only a surrounding shell of structures.
Texture	Activates the texture or photorealistic rendering mode. It creates a photorealistic appearance of the object. The shading depends on the orientation of the surface of the object. If both Texture and Gray Surface mode are switched on, the mixture percentage of both modes can be defined.
Render	Changes between the rendered image view and the view of a volume of interest. The volume of interest shows the acquired ultrasound images transformed into an isotropic rectangular coordinate system. The volume of interest can be manipulated as described above.
Threshold/Opacity	Threshold defines which gray values are used for rendering and which are considered noise. Opacity defines how strict Threshold is used for discrimination. A low opacity value creates a firmer appearance of the surface. A high opacity value leads to a transparent appearance of the rendered image.
Colorize/Contrast	Colorizes the 3D render or adds contrast to the 3D rendered image.
Orientation Marker	Displays the orientation marker on the 3D image. Select None, Sagittal, or Transverse.

Movie 3D


--:--:--
GE Healthcare
02/01/05 12:27:08 AM ADM
MI 0.24 TI 0.0
--:--:--
4C-RS
OB-2/3
3D Mode
Scalpel
Reset
Define Start
Define End
Menu
Movie Mode (Adv< >B)
1 Movie Speed
Auto Movie
2 Axis
3
Cancel
4
Pause
5
Manual

Active Data
Grey data

Render Mode
Grey Surf

Opacity
64

Threshold
10

Scan dist
6.0 cm

Figure 5-20. Movie 3D

Table 5-5: Movie 3D Descriptions and Instructions for Use

3D Parameter	Description
Manual	An animated rotation of the rendered image can be calculated and displayed by this function. Using this function, you first need to define the start and end position of the rotation. To define this, move the VOI to the start position, the press Define Start. Move the VOI to the end position and press Define End.
Movie 360 Degrees	The calculation and display of a complete rotation around the axis, defined by the Axis button, starts in steps of 15 degrees.
Auto Movie	Initializes the calculation and display of a 3D movie. A rotation of 30 degrees left and right around the actual image position (either the default position after acquisition or the position that was manually defined by manipulating the 3D volume of interest) is shown. For this 60 degree rotation, eleven images in steps of 6 degrees are calculated.
Axis	All rotations (Auto Move and Movie 360) are calculated as rotations around the specified axis (X, Y, or Z).
Movie Speed	You can adjust the speed of any 3D rotation.

Table 5-5: Movie 3D Descriptions and Instructions for Use

3D Parameter	Description
Pause	Stops and restarts the rotation. As soon as Pause is pressed, the different rotation steps can be displayed by moving the Trackball.

Chapter 6

Scanning/Display Functions

Describes additional ways in which to adjust the image. In addition, describes additional ways to get useful information electronically.

Zooming an Image

Introduction

Zoom is used to magnify a zoom region of interest (ROI). The system adjusts all imaging parameters accordingly. You can also zoom frozen images.

Zoom

Bioeffect

Zooming an image changes the frame rate which tends to change thermal indices. The position of the focal zones may also change which may cause the peak intensity to occur at a different location in the acoustic field. As a result, the MI may change.

Acoustic Output Hazard

Observe the output display for possible effects.

To zoom an image, adjust Zoom. A reference image appears in the upper, left-hand section of the display.

To exit zoom, adjust Zoom until the reference zoom image is removed or press **B**-Mode.

Split Screen

Overview

To activate a dual split screen, press ***L***.To activate a quad display, press and hold down ***L***.

To switch between active images, press ***L***/***R***.

To deactivate, press ***R*** until the screen changes.

Freezing an Image

Introduction

Freezing a real-time image stops all movement and allows you to measure and print the image.

NOTE: *While the image is frozen, all Power Output is suspended.*

NOTE: *Selecting a new probe unfreezes the image*

Freezing an image

To freeze an image,

1. Press Freeze. The key backlights.

If you are in a mixed mode, both screen formats stop immediately. Deactivating Freeze restarts both modes and places a black bar on the trace to indicate the time discontinuity.

To reactivate the image,

1. Press Freeze again.

NOTE: *Deactivating Freeze erases all measurements and calculations from the display (but not from the worksheet).*

Use the Trackball to start CINE after pressing Freeze.

Freezing an Image (Footswitch Option)

You can also freeze the image via the footswitch.

To freeze an image:

1. Step on the footswitch, the realtime icon is removed from the monitor.
2. If you are in a mixed mode, both screen formats stop immediately. Deactivating Freeze restarts both modes and places a black bar on the trace to indicate the time discontinuity.

To reactivate the image:

1. Press Freeze.

NOTE: Deactivating Freeze erases all measurements and calculations from the display (but not from the worksheet).

2. Use the Trackball to start CINE after pressing Freeze.

Post processing

You can use the following controls to process a frozen B-Mode image.

- Map
- Zoom
- Rotation
- Reverse
- Rejection
- Compression
- Gain

You can use the following controls to process a frozen Color Flow or Doppler Mode image.

- Angle Correct
- Invert
- CF
- Threshold
- Dynamic Range

NOTE: *Color cannot be added to a black and white image that has been frozen.*

Auto Optimize. Optimizes the B-Mode image or Doppler Spectrum.

Using CINE

Introduction

CINE images are constantly being stored by the system and are available for playback or manual review via CINE.

Timeline data is continually stored at four times the display width of timeline data (and updates the corresponding B-Mode images).

You can view CINE as a continuous loop via CINE Loop or manually review CINE images frame by frame via the Trackball.

Data in CINE is available until new data is acquired. CINE is stored on the system's memory and can be archived as well.

CINE is useful for focusing on images during a specific part of the heart cycle or to view short segments of a scan session.

Activating CINE

To activate CINE,

1. Press Freeze.
2. Move the Trackball.

CINE and Monitor Display

The CINE display (located on the left-hand side of the monitor) indicates which frame you are viewing of the whole loop (62:123), as well as the time at which this frame occurs within the loop (1.6:3.2 s).

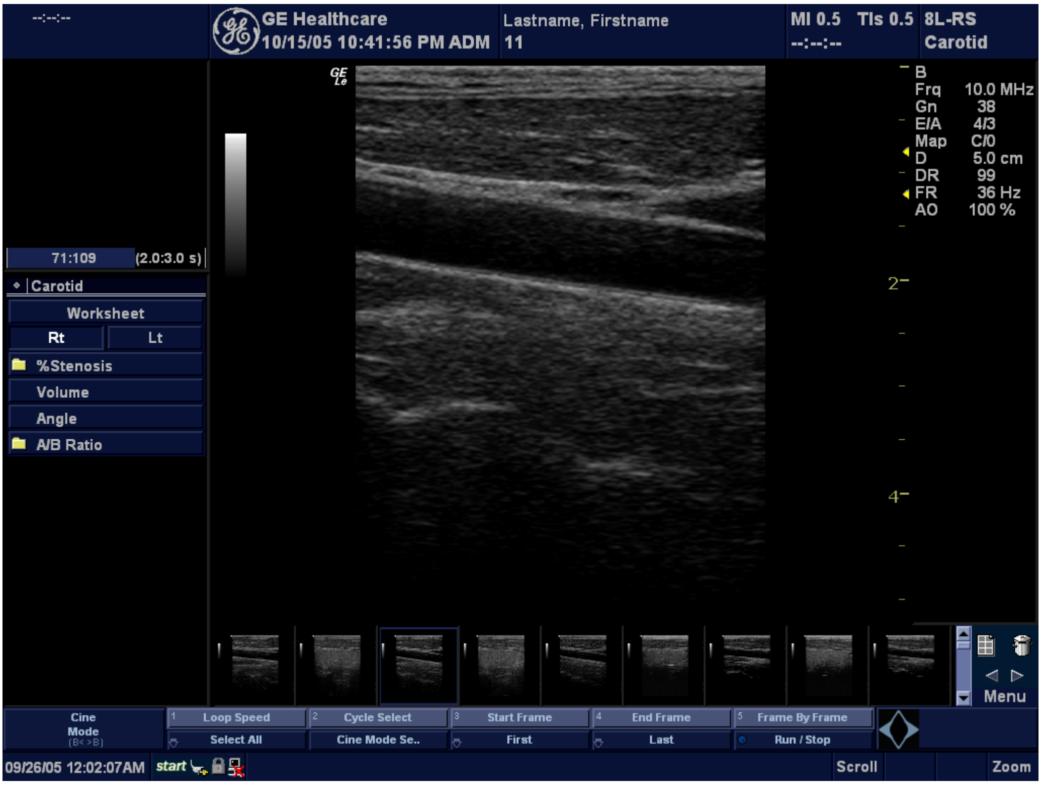

GE Healthcare
10/15/05 10:41:56 PM ADM
Lastname, Firstname
11
MI 0.5
TIs 0.5
8L-RS
Carotid
B
Frq 10.0 MHz
Gn 38
E/A 4/3
Map C/0
D 5.0 cm
DR 99
FR 36 Hz
AO 100 %
71:109
(2.0:3.0 s)
Carotid
Worksheet
Rt
Lt
%Stenosis
Volume
Angle
A/B Ratio
2
4
Menu
Cine Mode
Loop Speed
Cycle Select
Start Frame
End Frame
Frame By Frame
Select All
Cine Mode Se..
First
Last
Run / Stop
09/26/05 12:02:07AM
start
Scroll
Zoom

Figure 6-1. CINE Display

Using CINE

The following Top/Sub Menu appears:

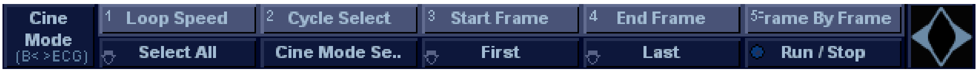

Cine Mode (B< >ECG)
1 Loop Speed
2 Cycle Select
3 Start Frame
4 End Frame
5 Frame By Frame
Select All
Cine Mode Se..
First
Last
Run / Stop

Figure 6-2. CINE Top/Sub Menu

Adjusting CINE Loop Speed

Adjust the Loop Speed control at the bottom of the Top/Sub Menu.

Disconnecting B-Mode CINE from Timeline CINE

To review the B-Mode CINE Loop only, select ***Cine Mode Selection*** and select ***B Only***.

To review the Timeline CINE Loop only, select ***Cine Mode Selection*** and select ***TL Only***.

To return to linked B-Mode and Timeline CINE Loop review, select ***Cine Mode Selection*** and select ***B/TL***.

Annotating an Image

Introduction

The comment function provides the capability to type the comments of free text and/or insert the pre-defined comments from the comment library. It also provides the user with arrow markers to point to parts of the image.

Pressing the **Comment** key or any keys on the alphanumeric keyboard initiates the comment mode. This assigns the trackball function to controlling the cursor and displays the comment library on the Top/Sub Menu menu.

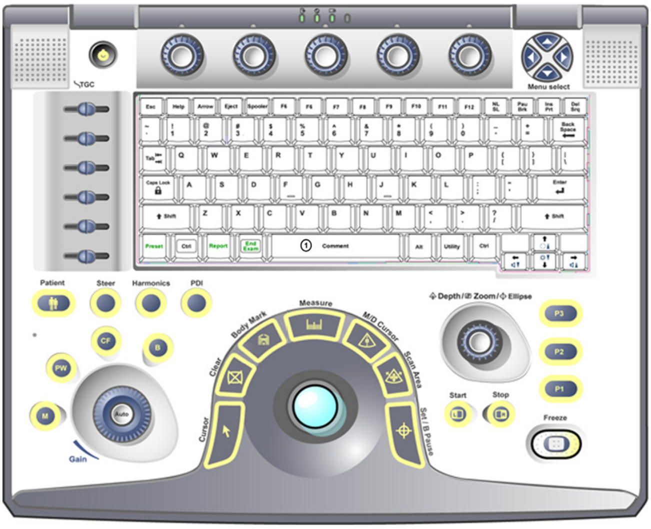

TGC
Menu select
1
Comment
Preset
Report
End Exam
Patient
Steer
Harmonics
PDI
CF
B
PW
M
Auto
Gain
Measure
Body Mark
M/D Cursor
Scan Area
Clear
Cursor
Set / B Pause
Depth / Zoom / Ellipse
P3
P2
P1
Start
Stop
Freeze

Figure 6-3. Comment Key on the Alphanumeric Keyboard

1. Comment Key

Introduction (continued)

In comment mode, text can be added by using the comment library or by typing from the alphanumeric keyboard.

Comments can be erased by powering down, when you press ***Clear*** or ***New Patient***, or when preset via Utility--> Comments.

In addition, the display's home position can be changed (preferred comment area) for each display so that all subsequent comments begin in the same spot.

Pressing the ***F11 (Set Home)*** key returns to the user specified position or factory default position.

A new cursor home position is established by placing the cursor in the desired position and pressing ***Shift+Home.***

Comment Mode is activated by pressing the ***Comment*** key. Comment Mode can also be automatically activated by typing from the alphanumeric keyboard.

NOTE: *In this case, the cursor begins at the same location where the comment mode was exited.*

The system automatically searches for the word you want in the comment bar and you can press tab to choose it.

After activating the comment mode, a vertical bar type cursor appears on the screen. Use the ***Trackball*** to move the cursor.

The factory default color for comments is yellow. The color selection can be changed to any of the colors available on the system. The choices are white, yellow, bright red, orange, etc.

NOTE: *The user cannot change the Font Family.*

To indicate a specific comment or text group is selected, the color turns to green. Once the comment is set or fixed, the color returns to yellow or to the user selected color.

To delete comments by character, press the ***Backspace*** key.

To delete all comments and arrow marks, press the ***Clear*** key twice immediately after entering the comment mode.

To exit the Comment/Library Comment function, press the next function you wish to do.

To move by words or by text group, press the ***Tab*** key.

Adding Comments to an Image

Comment Retention

Comments from the B-Mode images are retained and carried over when switching to multi-image format or duplex mode.

The position of the comments is adjusted so that it is at the same relative position with respect to the display window in the new format as it was in the single image format.

NOTE: *Comments may not be retained when the image is switched to M-Mode image format depending on the preset.*

Arrow Pointers

Arrow pointers can be used by activating the ***F2 (Arrow)*** key on the keyboard. When the pointer comes up, it is a GREEN color, indicating it is active and can be moved.

- Move the pointer using the ***Trackball*** to any place on the screen. The pointer head direction can be controlled by movement of the ***Trackball*** or ***Arrow Rotate*** control.
- To readjust the length and thickness of the pointer, use the **Arrow Resize** rotary control. The default for the pointer size can be preset.
- Press **Set** to fix the place of the pointer and direction of the pointer head. The GREEN color turns to YELLOW (or the default color if changed).
- To delete the arrow marks, press the ***Clear*** key right after pressing the ***F2 (Arrow)*** key.

NOTE: *This action clears the arrows only, not the comments on the screen. To erase all comments as well as arrows, press the Clear key right after the Comment key.*

Text Overlays

There are 2 layers of the text in comments, which can be selected by toggling the ***F12 (Text Overlay)*** function, which is pre-defined in the Utility -> Admin -> Function key preset.

By using this function, users can perform a HIDE TEXT/SHOW TEXT, allowing the users to save or printing an image without clearing the typed text.

Annotating an image using the library

To reduce the amount of time spent annotating an image, store frequently-used comments in the Comment Library. As many as 6 libraries are available per study. One of the selected libraries is designated as the default and its entries shall be displayed on the Top/Sub Menu when the comment mode is activated for that study.

Press **Comment** and move the comment cursor location using the **Trackball**.

Select the desired comment from the Top/Sub Menu.

Each Top/Sub Menu key can also be configured to hold a small list of up to 3 comments. The first word in the list is displayed on the Top/Sub Menu and the others can be accessed by toggling the key or pop-up menu. To show the presence of a small list stored under a particular key, a small indicator (>) is placed on the key.

To program your system with specific comments, See ‘Comments Libraries Presets’ on *page 16-43 for more information.*

Annotating an image with typed words

- Press **Comment** and type the comments where the cursor is currently located (the display's home position) and use the **Trackball** to further place the comment cursor in the desired location.
- Press ***Enter*** to move to the next line.

NOTE: *Comments wrap to the next line when they are within one character of the right margin if Word Wrapping is selected in the Text Boundary preset. See 'Comments Libraries/Comments Preset Menu' on page 16-46 for more information.*

The word wrap starts one line below the start of that comment.

Comments appear on all prints and photos.

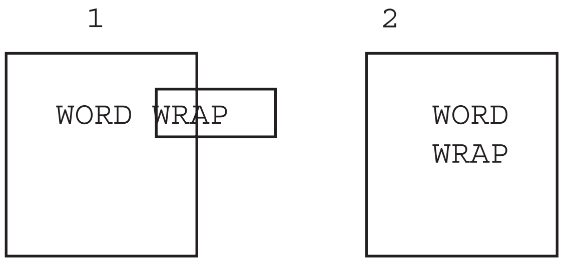


Figure 6-4. Next Line Word Wrap

1. Before
2. After

If the cursor appears at the right edge of the lowest line, or a word cannot be completed in the lower right corner, word wrap cannot be executed.

NOTE: *The same word wrap principles apply for library scripts as typed comments.*

Moving Texts You have the ability to move comments already on the screen and place them in different locations.

- Place the cursor on the desired text or text group and press ***Set***.
- The selected text color turns to green.
- Use the ***Trackball*** to move the selected text and press ***Set***.

Annotating an image with typed words (continued)

Editing while annotating

Backspace over any error(s) made. Blank spaces take the place of the letter(s) that were there. Continue typing the comment after backspacing over all incorrect letters.

To delete previous character(s):

- Press ***Backspace*** as many times as necessary to make the deletion.
- Once all texts within the selected text group are deleted, then the cursor will find another text group to delete to the upper left direction.
- If there is no more text to delete, the cursor will be located at home position.

To move through the text a word at a time:

- Press ***Tab*** to move to the right by text group (Preset Keyboard Tab = Word)

NOTE: Press Shift + Tab to move to the left.

To activate the last text group typed or selected from the Library:

- Adjust the ***Grab Word*** control. The selected comment will be highlighted.
- To increase/decrease the area of the highlighted selection use HIGHLIGHT rotary.

*NOTE: To select all text groups, press **Shift** + **Grab Word**.*

To cancel the last action:

- Press **Undo** key.

Body Patterns

An additional way to annotate the image display is with body patterns. Body patterns are a simple graphic of a portion of the anatomy that is frequently scanned. The body pattern and probe marker can serve as a reference for a patient and probe positioning when images are archived or scanned.

To activate body patterns, press the ***Body Mark*** control. A maximum of 5 body pattern packages are displayed on the Top/ Sub Menu according to exam category and preset.

The body pattern packages may be customized to accommodate user preference. Up to 30 individual body patterns in the packages can be changed. See 'Body Pattern Libraries/Applications Preset Menu' on *page 16-55 for more information.*

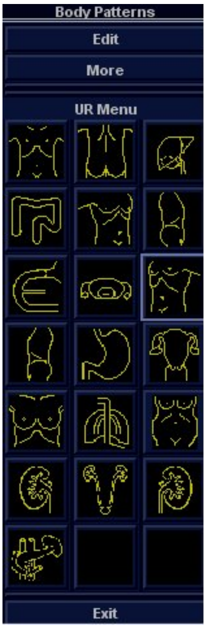


Figure 6-5.   Top/Sub Menu displays of Body Pattern

Body Patterns (continued)

Select the desired body pattern on the Top/Sub Menu. The selected body pattern is displayed on the monitor.

Press the **Move Pattern** control on the Top/Sub Menu to reposition the body pattern with the **Trackball** and **Set** controls.

A probe mark is associated with the body patterns and illustrates the probe position on the body pattern. This marker can be placed with the ***Trackball*** and rotated with the ***Ellipse*** control.

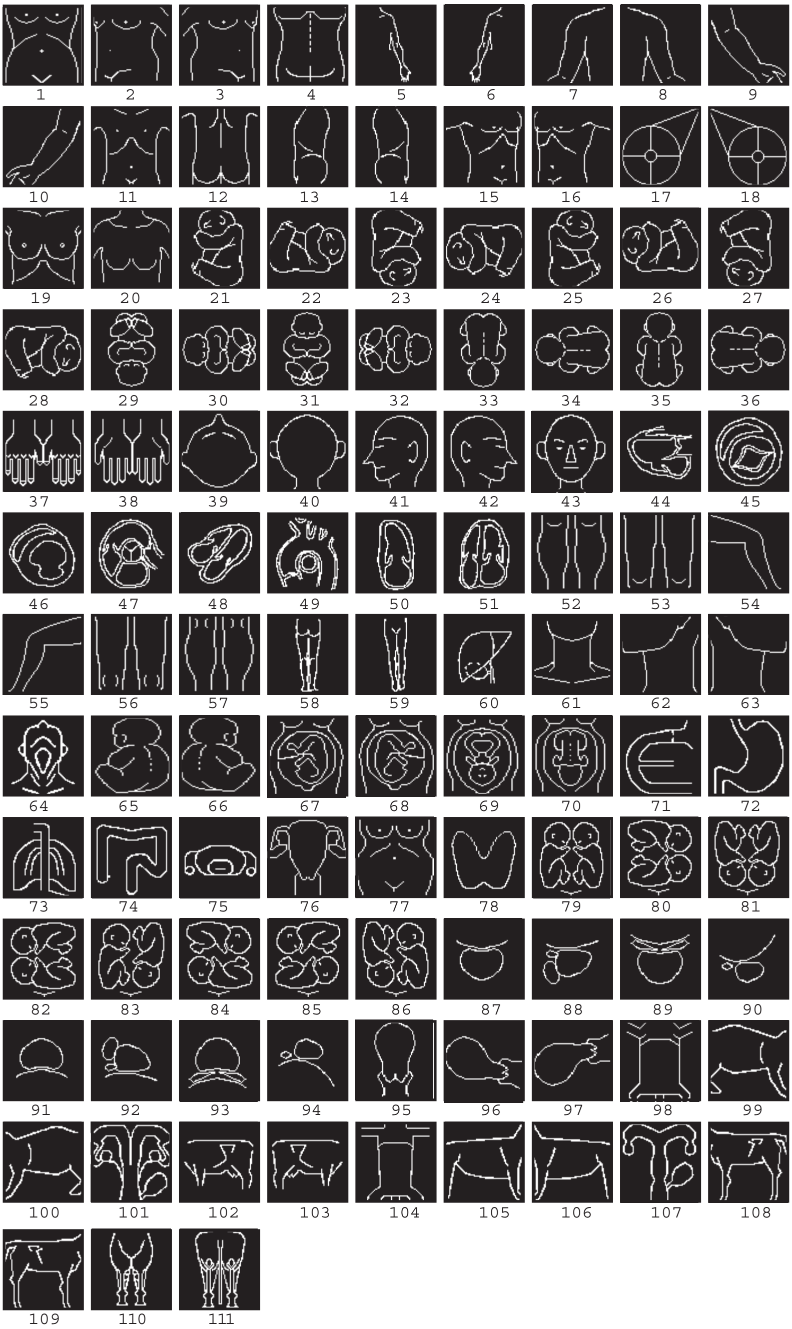
The probe mark type is selectable by rotating the **Probe Type** control on the Top/Sub Menu. There are different choices available with one being a blank selection.

To select the active side in dual B-Mode, use the **Active Side** rotary control at the bottom of the Top/Sub Menu.

Press the ***Body Mark*** and **Clear** controls to erase the body pattern. The pattern is erased and the system exits the body pattern mode.

Press ***Set*** on the keyboard or **Scan** on the Top/Sub Menu to exit without erasing the body pattern.

Body Patterns (continued)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101
102
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104
105
106
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110
111

Figure 6-6. Body Patterns Available

Body Patterns (continued)

1. abdom1
2. abdom2
3. abdom3
4. abdom4
5. arm1
6. arm2
7. arm3
8. arm4
9. arm5
10. arm6
11. body1
12. body2
13. body3
14. body4
15. body5
16. body6
17. breast1
18. breast2
19. breast3
20. chest
21. fetus1
22. fetus2
23. fetus3
24. fetus4
25. fetus5
26. fetus6
27. fetus7
28. fetus8
29. fetus9
30. fetus10
31. fetus11
32. fetus12
33. fetus13
34. fetus14
35. fetus15
36. fetus16
37. hand1
38. hand2
39. head1
40. head2
41. head3
42. head4
43. head5
44. heart1
45. heart2
46. heart3
47. heart4
48. heart5
49. heart6
50. heart7
51. heart8
52. leg1
53. leg2
54. leg3
55. leg4
56. leg5
57. leg6
58. leg7
59. leg8
60. liver
61. neck1
62. neck2
63. neck3
64. neck4
65. ob1
66. ob2
67. ob3
68. ob4
69. ob5
70. ob6
71. organ1
72. organ2
73. organ3
74. organ4
75. organ5
76. pelvis1
77. pelvis2
78. thyroid
79. twin1
80. twin2
81. twin3
82. twin4
83. twin5
84. twin6
85. twin7
86. twin8
87. uro1
88. uro2
89. uro3
90. uro4
91. uro5
92. uro6
93. uro7
94. uro8
95. uterus1
96. uterus2
97. uterus3
98. vet-cat1
99. vet-cat2
100. vet-cat3
101. vet-cow1
102. vet-cow2
103. vet-cow3
104. vet-dog1
105. vet-dog2
106. vet-dog3
107. vet-horse1
108. vet-horse2
109. vet-horse3
110. vet-horse4
111. vet-horse5

Electronic Documentation

Documentation Distribution

Documentation is being provided via:

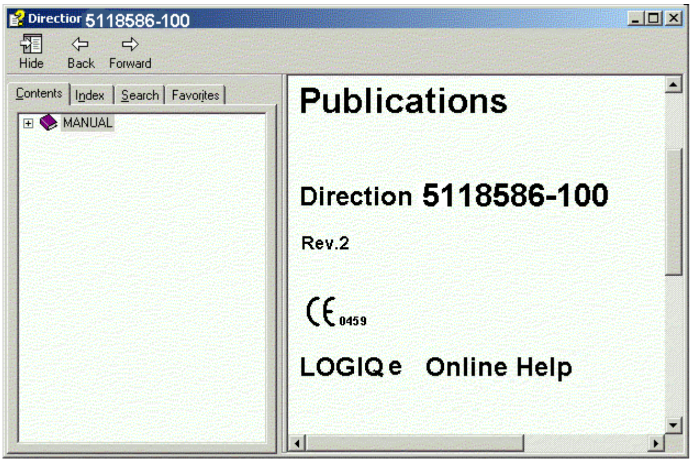
- Release Notes (supplied on paper)
- Quick Guide or User Guide (supplied on paper)
- AIUM Acoustic Output Booklet
- AIUM Acoustic Output Booklet (USA Only)
- Online Help (on the Ultrasound Scanner via F1)
- Electronic media. You can view user documentation on a PC or on the Ultrasound Scanner via the Customer Documentation media, which includes:
    - Basic User Manual
    - Advanced Reference Manual
    - Quick Guide
    - User Guide
    - Quick Card(s)
    - Release Notes and Workarounds
    - Basic Service Manual

NOTE: *All user documentation is provided in multiple languages if translations were available at the time of media publication.*

Using Online Help Via F1

Online Help is available via the F1 key. After pressing F1, Help appears. The Help screen is divided into three sections: navigational tools on the top, left portion of the screen (Hide, Back, Forward), help book navigational tools on the left portion of the screen (Contents, Index, Search, Favorites), and the content portion on the right side of the screen where help topics are displayed.

*NOTE: If the cursor is lost while using Online Help, press **Alt** + **F4** to exit or press **F1** to activate the cursor.*


Direction 5118586-100
Hide
Back
Forward
Contents
Index
Search
Favorites
MANUAL

Publications

Direction 5118586-100

Rev.2

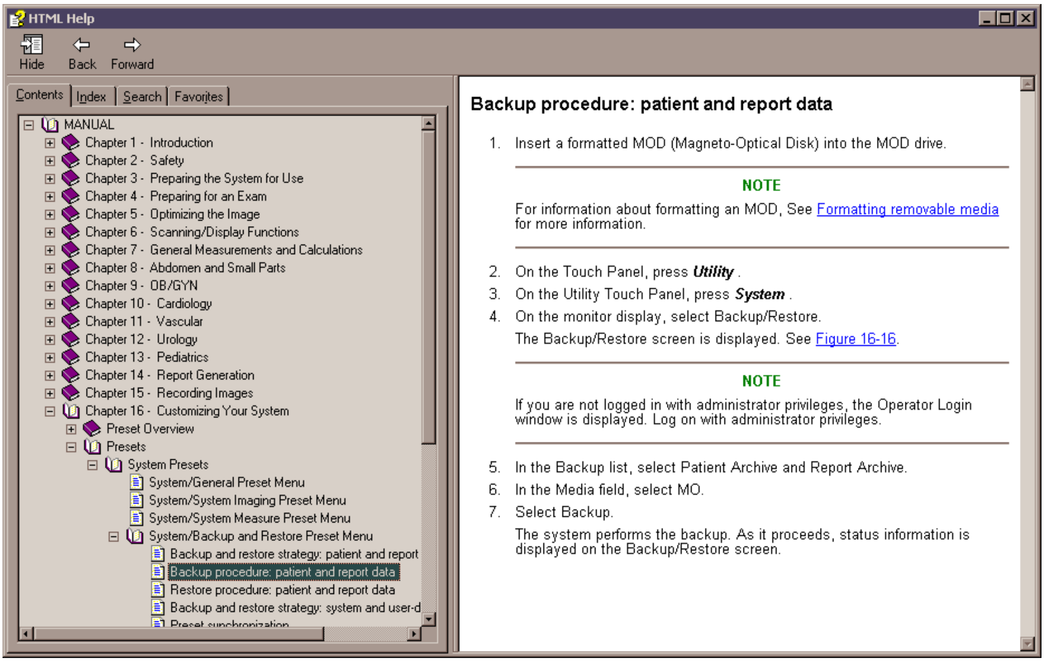
CE 0459

LOGIQ e Online Help

Figure 6-7. Opening Help Screen

Navigating through the Help Book

Online Help is organized like a manual, with individual chapters, sections, and pages. Click on the plus (+) sign next to MANUAL to open up the book. Click on the plus sign next to the chapter you want to view to open up that chapter. Click on the plus sign next to the chapter you want to view to open up that section. Open up the page to view that page's information.


HTML Help
Hide
Back
Forward
Contents
Index
Search
Favorites
MANUAL
Chapter 1 - Introduction
Chapter 2 - Safety
Chapter 3 - Preparing the System for Use
Chapter 4 - Preparing for an Exam
Chapter 5 - Optimizing the Image
Chapter 6 - Scanning/Display Functions
Chapter 7 - General Measurements and Calculations
Chapter 8 - Abdomen and Small Parts
Chapter 9 - OB/GYN
Chapter 10 - Cardiology
Chapter 11 - Vascular
Chapter 12 - Urology
Chapter 13 - Pediatrics
Chapter 14 - Report Generation
Chapter 15 - Recording Images
Chapter 16 - Customizing Your System
Preset Overview
Presets
System Presets
System/General Preset Menu
System/System Imaging Preset Menu
System/System Measure Preset Menu
System/Backup and Restore Preset Menu
Backup and restore strategy: patient and report
Backup procedure: patient and report data
Restore procedure: patient and report data
Backup and restore strategy: system and user-d
Preset synchronization

Backup procedure: patient and report data

1. Insert a formatted MOD (Magneto-Optical Disk) into the MOD drive.

NOTE

For information about formatting an MOD, See Formatting removable media for more information.

2. On the Touch Panel, press ***Utility*** .
3. On the Utility Touch Panel, press ***System*** .
4. On the monitor display, select Backup/Restore.

   The Backup/Restore screen is displayed. See Figure 16-16.

NOTE

If you are not logged in with administrator privileges, the Operator Login window is displayed. Log on with administrator privileges.

5. In the Backup list, select Patient Archive and Report Archive.
6. In the Media field, select MO.
7. Select Backup.

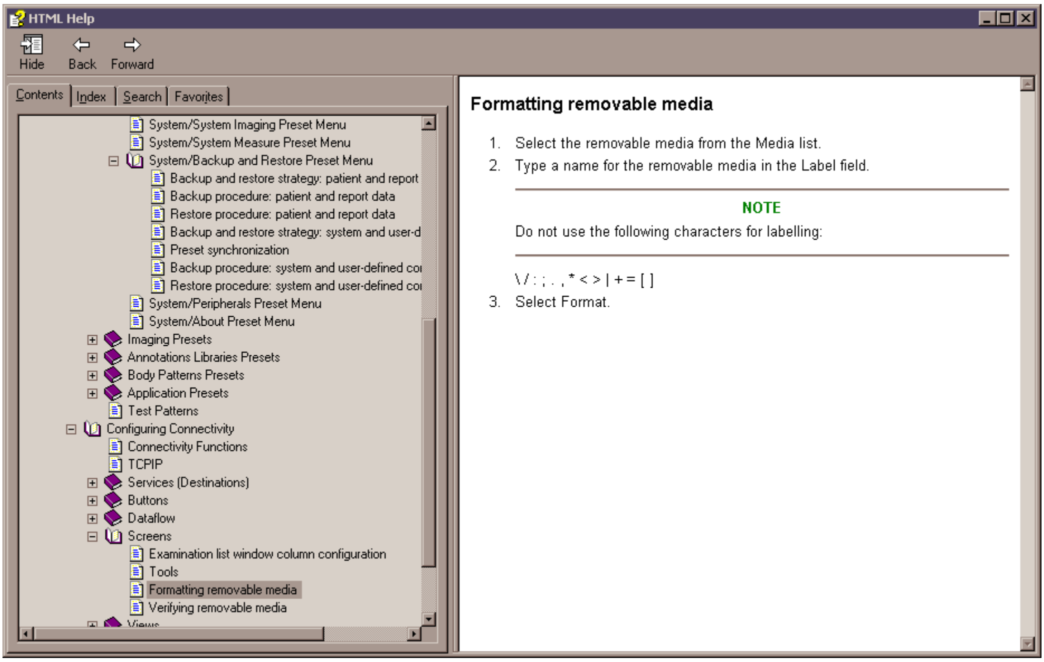
   The system performs the backup. As it proceeds, status information is displayed on the Backup/Restore screen.

Figure 6-8. Sample Help Topic

The blue, underlined text links you to related topics. Click on the link to move to the new topic.

Links

After you click on a blue, underlined portion of text, the screen updates with this link's content. To go back to the previous screen, press Back. To return to the link, press Forward.


HTML Help
Hide
Back
Forward
Contents
Index
Search
Favorites
System/System Imaging Preset Menu
System/System Measure Preset Menu
System/Backup and Restore Preset Menu
Backup and restore strategy: patient and report
Backup procedure: patient and report data
Restore procedure: patient and report data
Backup and restore strategy: system and user-d
Preset synchronization
Backup procedure: system and user-defined co
Restore procedure: system and user-defined co
System/Peripherals Preset Menu
System/About Preset Menu
Imaging Presets
Annotations Libraries Presets
Body Patterns Presets
Application Presets
Test Patterns
Configuring Connectivity
Connectivity Functions
TCPIP
Services (Destinations)
Buttons
Dataflow
Screens
Examination list window column configuration
Tools
Formatting removable media
Verifying removable media

Formatting removable media

1. Select the removable media from the Media list.
2. Type a name for the removable media in the Label field.

NOTE

Do not use the following characters for labelling:

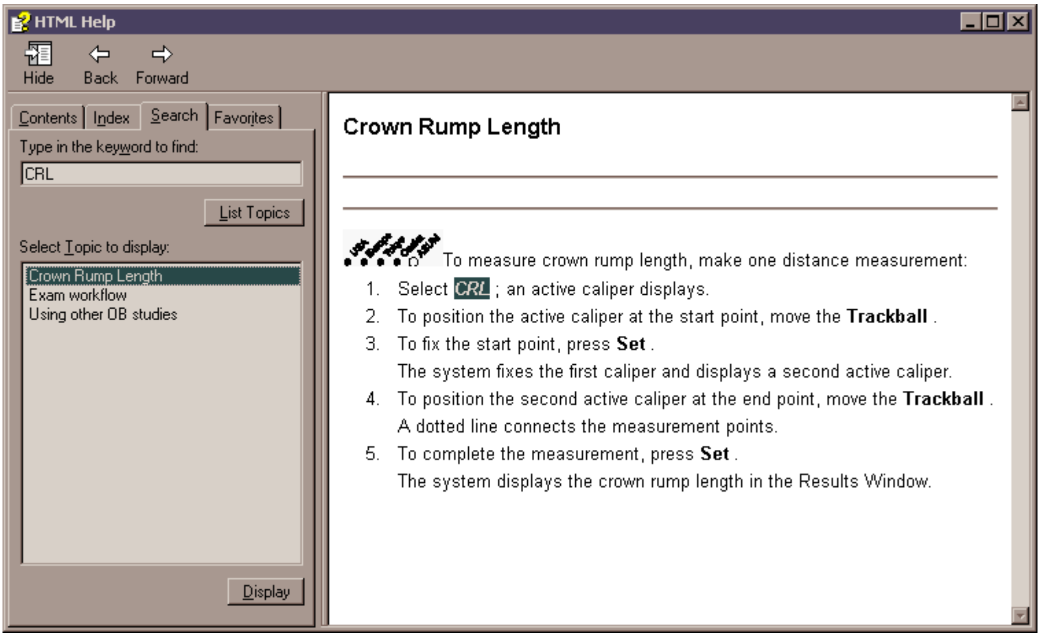
\ / : ; . , * < > | + = [ ]

3. Select Format.

Figure 6-9. Topic Link

Searching for a Topic

To search for a specific topic, click on the Search tab in the left portion of the screen. Type in the topic name in the *Type in the keyword to find:* field. Topics with the word or phrase you typed appear in the *Select Topic to display: area*. Either double click on the topic you want to view or highlight the topic and press the Display button to view this topics.



Type in the keyword to find: CRL

Select Topic to display:

- Crown Rump Length
- Exam workflow
- Using other OB studies

Crown Rump Length

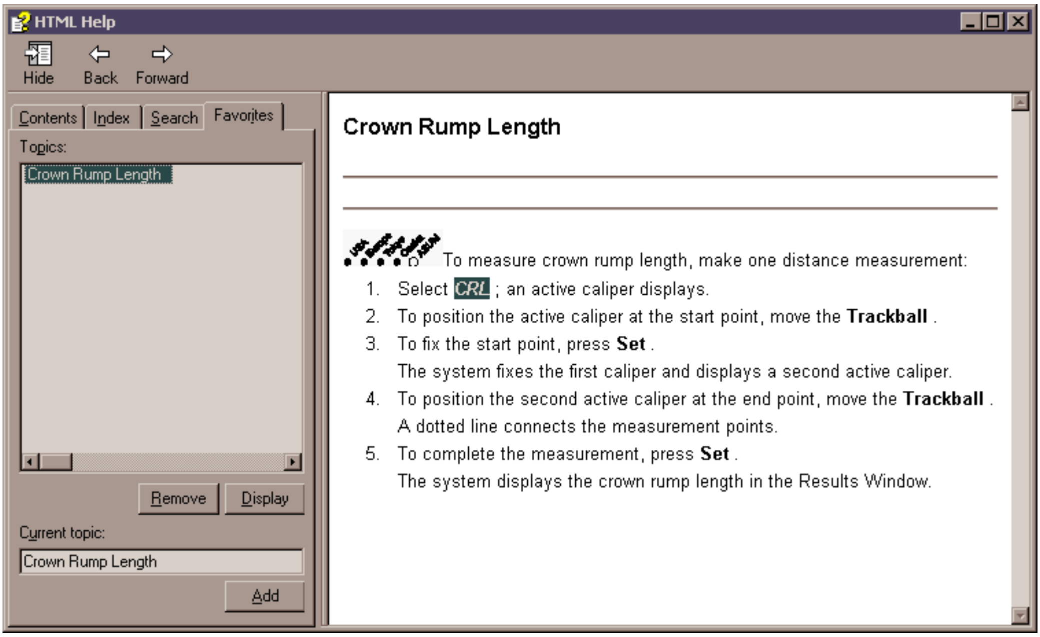
To measure crown rump length, make one distance measurement:

1. Select CRL ; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball** .
3. To fix the start point, press **Set** .
   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball** .
   A dotted line connects the measurement points.
5. To complete the measurement, press **Set** .
   The system displays the crown rump length in the Results Window.

Figure 6-10. Search Results

Saving Favorite Topics

You may find that there are topics you need to refer to often. In this case, it’s a good idea to save these topics as Favorites. To save a topic as a favorite, press the Favorites tab, highlight the topic in the Topics window, and press the Add button. You can now view this topic quickly by going to the Favorites help tab.


HTML Help
Hide
Back
Forward
Contents
Index
Search
Favorites
Topics:
Crown Rump Length
Remove
Display
Current topic:
Crown Rump Length
Add

Crown Rump Length

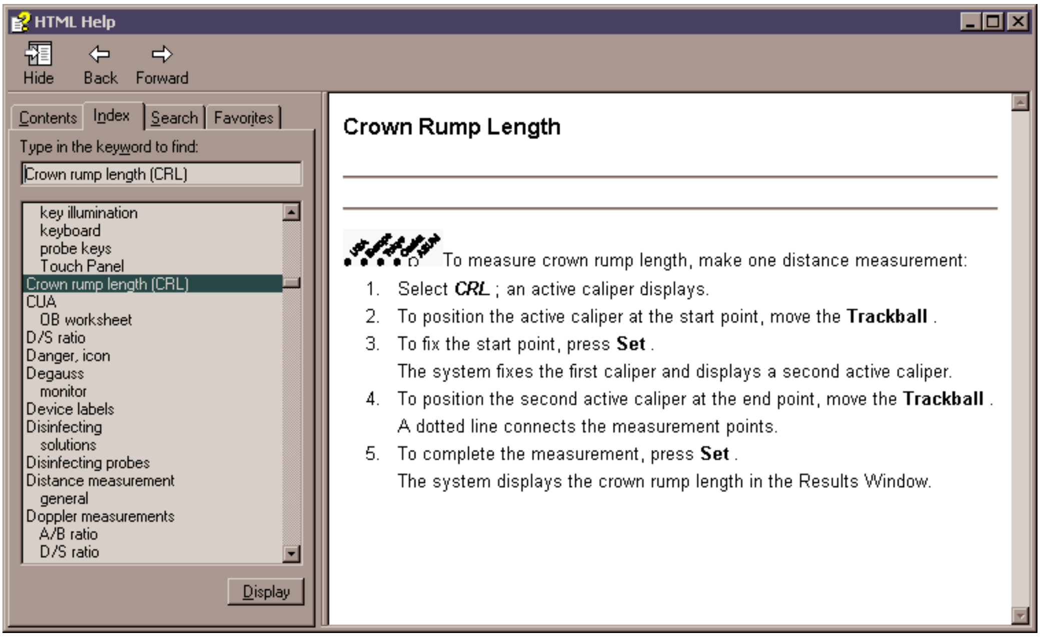
To measure crown rump length, make one distance measurement:

1. Select CRL ; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball** .
3. To fix the start point, press **Set** .
   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball** .
   A dotted line connects the measurement points.
5. To complete the measurement, press **Set** .
   The system displays the crown rump length in the Results Window.

Figure 6-11. Adding Favorites

Using the Index

Or, you can look for topics by using the Index. Press the Index tab, then use the scroll bar to look up a topic.


HTML Help
Hide
Back
Forward
Contents
Index
Search
Favorites
Type in the keyword to find:
Crown rump length (CRL)
key illumination
keyboard
probe keys
Touch Panel
Crown rump length (CRL)
CUA
OB worksheet
D/S ratio
Danger, icon
Degauss
monitor
Device labels
Disinfecting
solutions
Disinfecting probes
Distance measurement
general
Doppler measurements
A/B ratio
D/S ratio
Display

Crown Rump Length

To measure crown rump length, make one distance measurement:

1. Select *CRL* ; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball** .
3. To fix the start point, press **Set** .
   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball** .
   A dotted line connects the measurement points.
5. To complete the measurement, press **Set** .
   The system displays the crown rump length in the Results Window.

Figure 6-12. Index

Other Help Features

To hide the left side of the screen, press the Hide icon at the upper, left-hand portion of the screen. To view the left side of the screen again, press the Show icon at the upper, left-hand portion of the screen.

To size the Help window, position and hold down the cursor at the corner of the screen while moving the Trackball.

To move the Help window to the Top/Sub Menu display, position and hold down the cursor at the very top of the Help window while moving the Trackball to the Top/Sub Menu display.

Exiting Online Help

To exit Online Help, press the ‘X’ in the upper, right-hand corner of the Online Help window.

Electronic media

Accessing Documentation Via a PC

To view user documentation on a PC,

1. Insert the media into the media drive.
2. Open the media drive on your desktop.
3. Double click on the ‘gedocumentation.html’ document.
4. Select the item you want to view (click on the blue, underlined link in the File Name column).

To close the window, click on the ‘X’ in the upper, right-hand corner of the browser window.

NOTE: *If your PC does not have Adobe Reader, a free download is available on the Adobe website at http://www.Adobe.com.*

Chapter 7

General Measurements and Calculations

Describes how to perform general measurements and calculations.

Introduction

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements is not only determined by system accuracy, but also by the use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigators are so noted. Be sure to refer to the original article describing the investigator's recommended clinical procedures.

Overview

This section provides information about taking measurements and describes calculations available in each mode. It includes the following topics:

- Exam workflow
- Location of measurement controls
- Description of calipers
- List of generic measurements
- General information about taking measurements
- Mode Measurements: Step-by-step instructions for taking specific measurements, organized by mode
- Basic steps to view and edit worksheets

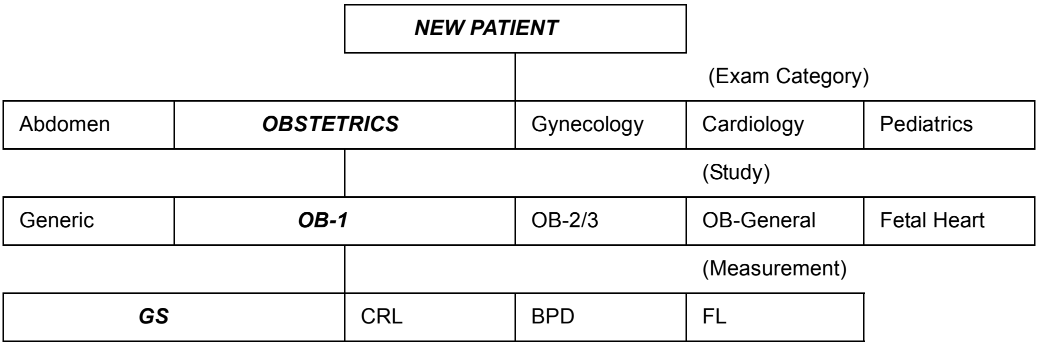
Exam workflow

For each patient, the system organizes information by exam category, study, and measurement. The definitions of these terms are as follows:

- **Exam Category** – categories include the following:
  - Abdomen
  - Obstetrics
  - Gynecology
  - Cardiology
  - Vascular
  - Urology
  - Small Parts
  - Pediatrics
- **Study/Preset** – after you choose an exam category, the system allows you to select a study. For example, when you choose the Obstetrics exam category, you can choose one of the following studies:
  - Generic
  - OB-1
  - OB-2/3
  - OB-General
  - Fetal Heart
  - OB/GYN Vessel
- **Measurement** – the measurements and calculations needed to analyze an item of anatomy. For example, a femur length is a measurement. A measurement can include several pieces of measurement data. For example, to calculate the area of a gestational sac, you need to measure width, length, and depth.

Exam workflow (continued)

The following shows a workflow example for an obstetrics exam.


NEW PATIENT
(Exam Category)
Abdomen
OBSTETRICS
Gynecology
Cardiology
Pediatrics
(Study)
Generic
OB-1
OB-2/3
OB-General
Fetal Heart
(Measurement)
GS
CRL
BPD
FL

For details on how to start a new patient, See ‘Beginning a New Patient’ on *page 4-3 for more information.*

Location of Measurement Controls

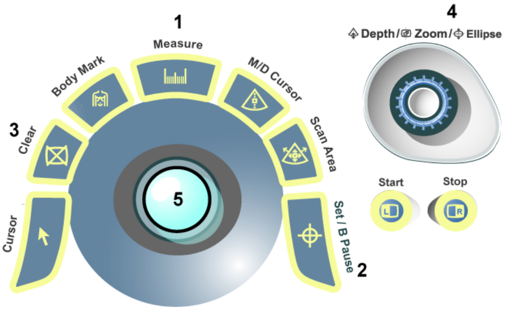


Figure 7-1. Locating Measurement Controls

1. **Measure**. Activates a measurement caliper and the associated calculation package.
2. **Set**. Fixes the caliper for measurements and completes the measurement sequence.
3. **Clear**. During a measurement sequence, erases the measuring caliper and measurement data from the display. When not performing a measurement sequence, clears all calipers and measurements from the display.
4. **Ellipse**. After the first caliper for a distance measurement has been set and the second caliper positioned, **Ellipse** activates the area/ellipse measurement function. During the ellipse adjustment, use the **Trackball** to increase or decrease the size of the ellipse. Select ***Cursor Select*** to adjust the measurement calipers.
5. **Trackball**. Moves the measurement calipers, selects the measurement on the Summary Window.

Description of calipers

While you are making a measurement, the measurement caliper is either active (open plus sign) or fixed (closed plus sign). An active caliper is green and a fixed caliper is yellow.

The system allows you to identify measurements by number or by unique symbol. If you choose Number as the Cursor Type, after you complete a measurement, it is assigned a number. If you choose Symbol as the Cursor Type, after you complete a measurement, the caliper symbol changes to one of the nine shown below. The symbols are used in sequence as listed. The first symbol is used for the first measurement, the second symbol for the second measurement, and so on. The numbers or symbols also identify measurements in the Results Window.

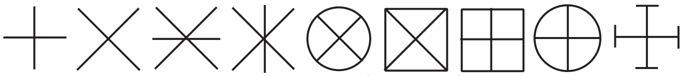


Figure 7-2. Fixed Caliper Symbols

For information about how to choose Cursor Type of Number or Symbol, See ‘System/System Measure Preset Menu’ on *page 16-14 for more information.*

Measurement line display

While you are making a measurement, the system displays a dotted line to show the measurement. After you press **Set** to complete the measurement, the dotted line remains on the display if the Show Caliper Line in the Options tab is selected. If Show Caliper Line is not selected, the system erases the dotted line and only the measurement calipers with a number or symbol are displayed. The Show Caliper Line on the Options tab takes precedence over the Cursor Line Display preset, found on the System -> System Measure screen.

List of general measurements

The following table shows the types of general measurements available when you press **Measure** but do not choose a specific calculation. The type of measurement depends on the current scan mode and the number of times **Measure** is pressed.

Table 7-1: General Measurements by Mode

If you press *Measure* (while frozen)	**MODE**		
	B and CF	**Doppler**	**M**
Once	• Distance • Circumference and area (ellipse)	Velocity	Tissue depth
Twice	Circumference and area (trace, spline trace or open trace)	TAMAX and TAMEAN	Time interval
Three times	• Circumference and area (trace, spline trace or open trace) • Echo level	Two velocities, time and acceleration	Time and velocity
Four times	• Circumference and area (trace, spline trace or open trace) • Echo level	Time	

NOTE: The type of measurement repeats as you press ***Measure****. For example, in M-Mode, when you press* ***Measure*** *the fourth time, the Tissue depth measurement is available, and so on.*

General Instructions

You can take measurements in all modes and image formats, including real-time, frozen, or CINE. After you select an exam category, the available calculations are displayed on the Top/ Sub Menu.

Measurement and calculation results

As you take measurements, each measurement is given a sequential number on the display and in the Results Window. The system can display nine measurements on the screen at one time.

While you are taking a measurement, the value in the Results Window updates until you complete the measurement.

Once the Results Window has nine measurements, if you make any further measurements, the system erases the first measurement and adds the new measurement ("first in, first out").

Selecting a calculation

When you take measurements, you can select the calculation before you take the measurement or after you take it. For example, in Obstetrics, if you select the calculation before you take the measurement, the estimated fetal age is displayed as you take the measurement. If you select the calculation after you take the measurement, the estimated fetal age is displayed after you complete the measurement.

NOTE: *After you take a measurement, if you select a calculation and the measurement is not applicable for the calculation, then the system assumes you want to start the calculation. The system then uses the calculation for the next measurement.*

Selecting a calculation (continued)

If there is a measurement listed in the Results Window that has not been assigned a calculation, to assign the measurement:

1. Press Measure.
2. To select the measurement in the Results Window, move the **Trackball** to the measurement.

   The measurement is highlighted.
3. Press **Set**.

   The system displays a list of applicable calculations. For example, if it is a distance measurement, the list includes all distance calculations for the current study.
4. To select an item in the list, move the **Trackball** to highlight the item and press **Set**.

   The system assigns the calculation to the measurement.

Selecting a measurement in a different application

While scanning a patient, you may find that you want to measure an item that is not in the current application. To select a calculation from a different application:

1. Press **Measure**.
2. Move the cursor to the exam category on the Top/Sub Menu and press **Set**.
3. The system lists the exam categories.
4. Select the exam category that has the calculation you want to make.

   The system displays the Top/Sub Menu for the selected exam category.
5. Select the study and the desired measurement.
6. After you complete the measurement, to return to the original application, repeat steps 1–4.

NOTE: *This measurement **DOES NOT** appear on the original application worksheet.*

Specifying measurement and display options

Specifying heart rate cycles

When you measure heart rate, the system assumes a specific number of cycles are measured. You can change the number of cycles used in the calculation. To specify the number of heart rate cycles, press the Utility key, select Measure. Select the Advanced tab, then select ***Heart Rate Cycle***. The system displays a list of choices from 1 – 10. Select the number you want.

After you choose a number, the next time you measure heart rate, the system assumes you are measuring the specified number of cycles. That number is used when calculating the heart rate.

After changing patients, the system defaults to the number specified in the Heart Rate Cycle parameter. See 'M&A Advanced Preset' on *page 7-45 for more information.*

Moving the Results Window

You may want to change where the Results Window is positioned on the monitor display. There are two ways to move the Results Window:

1. Move the pointer over the "Move Results Window Icon" and press **Set**. Position the window in the desired location and press **Set** again to fix that position.

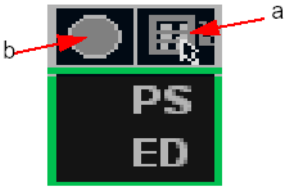


Figure 7-3. Results Window Icons

   a. Move Results Window Icon
   b. Minimize Results Window Icon

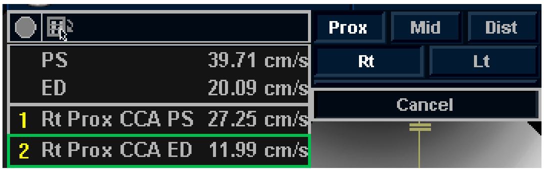
2. Select Utility -> System -> System Measure. In the Results Window portion, you can position the window on the screen. The display can be moved into the following locations:
   - Left Top
   - Right Top
   - Right Bottom
   - Left Bottom

Minimizing the Results Window

To minimize the Results Window, move the pointer over the "Minimize Results Window Icon" and press **Set**.

Post-assignment for Side/Location

1. Move the cursor to the result box (with the green frame) and press **Set**. The post-assignment menu appears.
2. Select Side and Location as needed.



PS 39.71 cm/s
ED 20.09 cm/s
1 Rt Prox CCA PS 27.25 cm/s
2 Rt Prox CCA ED 11.99 cm/s

Figure 7-4. Post-assignment menu

NOTE: This feature is only available in manual calcs.

General Instructions (continued)

The following are actions you can take while performing measurements.

HINTS

- Before making measurements, to stop the acquisition of image data, press **Freeze**.
- For measurements such as distance, to make fine adjustments before completing the measurements, press **Measure** to toggle between active calipers.
- Before completing the measurement sequence, to erase the active measuring caliper and the current data measured, press **Clear**.
- After the sequence is complete, to erase all data that has been measured to this point, but not data entered on worksheet pages, press **Clear**.
- When there are several measurements on the display, to rotate through and activate previously fixed calipers, select **Cursor Select**. After a cursor is activated, you can change the measurement.

  NOTE: If you want to change a trace measurement, you must erase it and trace again.
- To repeat any measurement, select that measurement again from the Top/Sub Menu.

Calculation formulas are available in the *Advanced Reference Manual*.

Erasing measurements

The following actions erase measurements from the system's memory:

HINTS

- If you adjust the Trackball, unfreeze the image, or press Clear, the system erases all completed measurements and calculations on the display. Measurements and calculations, however, remain on the worksheets.
- If you select New Patient, the system erases all measurements and calculations on the display and clears the worksheets.
- If you make a new measurement that exceeds the maximum number of allowable measurements, the system erases the first (oldest) measurement and adds the new measurement.
- If the second caliper is active, to erase the second caliper and activate the first caliper, press Clear.

Measurement and Calculation Setup

Measurements and studies are organized for typical work flows. If you want, you can change this set up. You can specify which studies are in each exam category, and which measurements and calculations are in each study. You can change the measurements that are available on the Top/Sub Menu. The LOGIQ e allows you to quickly and easily set up your system so that you can work most efficiently.

This section describes how to:

- Change a study to include different measurements
- Add a new study or measurement
- Remove a study from an exam category
- Change measurement parameters
- Create a measurement formula to correctly handle unit conversions
- Edit user-defined calculations
- Define application-specific measurement parameters
- Specify the default manual calc measurements for a selected study or folder

Starting Study and Measurement SetUp

You can make changes to studies and measurements in the Measurement & Analysis screen. To open the screen:

1. Press ***Utility***.

   The system displays the Utility screen on the monitor display.
2. Select ***Advanced***.
3. Select ***Measure***.
4. Move the **Trackball** to the Measure button at the bottom of the screen and press **Set**.

   The system displays the Measurement & Analysis screen.

Starting Study and Measurement SetUp (continued)

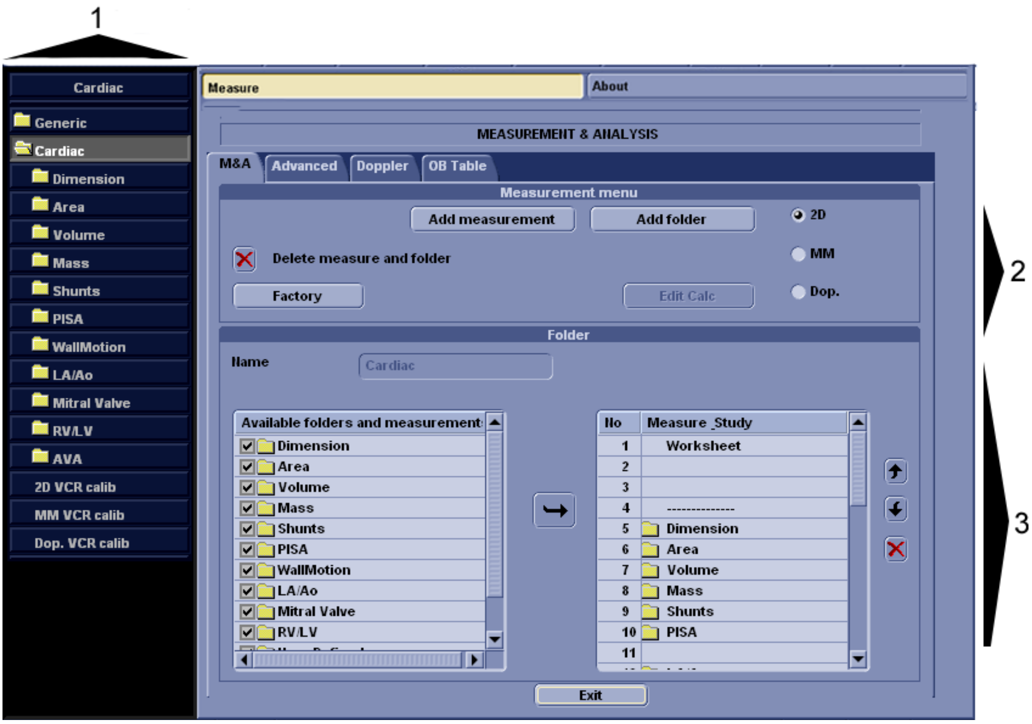

1
2
3
Cardiac
Generic
Cardiac
Dimension
Area
Volume
Mass
Shunts
PISA
WallMotion
LA/Ao
Mitral Valve
RV/LV
AVA
2D VCR calib
MM VCR calib
Dop. VCR calib
Measure
About
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
● 2D
○ MM
○ Dop.
Delete measure and folder
Factory
Edit Calc
Folder
Name
Cardiac
Available folders and measurement
☑ Dimension
☑ Area
☑ Volume
☑ Mass
☑ Shunts
☑ PISA
☑ WallMotion
☑ LA/Ao
☑ Mitral Valve
☑ RV/LV
No
Measure_Study
1 Worksheet
2
3
4 --------------
5 Dimension
6 Area
7 Volume
8 Mass
9 Shunts
10 PISA
11
Exit

Figure 7-5. Measurement & Analysis screen

1. **Selection menu**: select exam category, study, or measurement.
2. **Measurement menu**: add and delete studies (folders) and measurements; select mode.
3. **Folder or measurement**: define studies and measurements. This section changes between Folder and Measurement, depending on what you select in the Selection menu.

NOTE: In the Measure menu, the navigational tabs across the top may differ from system to system but the functionality is the same.

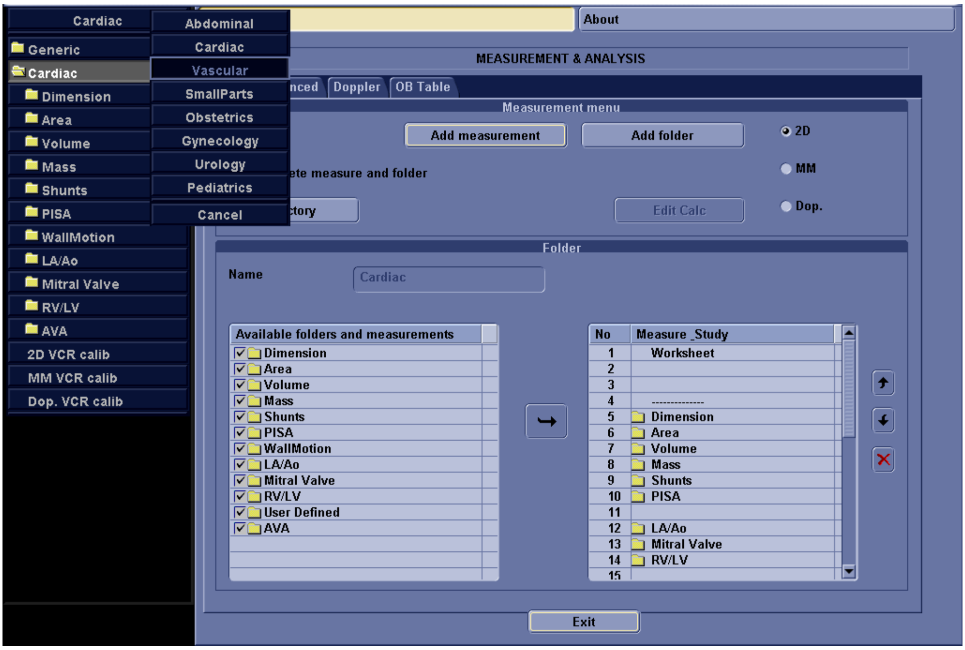
Selecting an exam category

When you open the Measurement & Analysis screen, it displays the exam category that was last used on the system. To select the exam category you want to work with:

1. Move the **Trackball** to highlight the exam category at the top of the Selection menu.
2. Press **Set**.

   The system displays a list of exam categories.
3. Move the **Trackball** to highlight the exam category you want.
4. Press **Set**.

The Selection menu lists studies and measurements for the selected exam category.


Cardiac
Generic
Cardiac
Dimension
Area
Volume
Mass
Shunts
PISA
WallMotion
LA/Ao
Mitral Valve
RV/LV
AVA
2D VCR calib
MM VCR calib
Dop. VCR calib
Abdominal
Cardiac
Vascular
SmallParts
Obstetrics
Gynecology
Urology
Pediatrics
Cancel
About
MEASUREMENT & ANALYSIS
nced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
ete measure and folder
tory
Edit Calc
Folder
Exit

● 2D
○ MM
○ Dop.

Name: Cardiac

Available folders and measurements
- ☑ Dimension
- ☑ Area
- ☑ Volume
- ☑ Mass
- ☑ Shunts
- ☑ PISA
- ☑ WallMotion
- ☑ LA/Ao
- ☑ Mitral Valve
- ☑ RV/LV
- ☑ User Defined
- ☑ AVA

No	Measure _Study
1	Worksheet
2	
3	
4	-------------
5	Dimension
6	Area
7	Volume
8	Mass
9	Shunts
10	PISA
11	
12	LA/Ao
13	Mitral Valve
14	RV/LV
15	

Figure 7-6. Select Exam Category

Selecting the measurement mode

In the Measurement menu section of the Measurement & Analysis screen, select one of the following:

- 2D (B-Mode)
- MM (M-Mode)
- Dop (Doppler Mode)

The Selection menu lists studies and measurements for the selected mode.

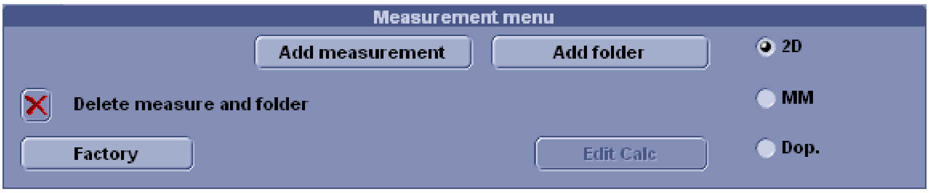
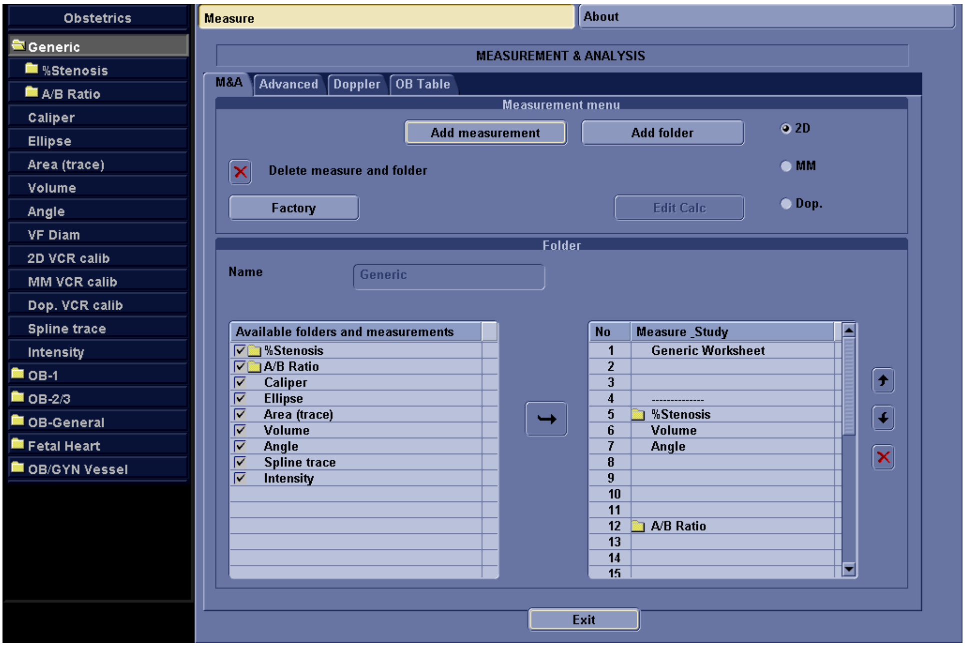

Measurement menu
Add measurement
Add folder
● 2D
Delete measure and folder
○ MM
Factory
Edit Calc
○ Dop.

Figure 7-7. Select Mode

Selecting a study or measurement

To work with a folder or measurement, you must first select it in the Selection menu. The Selection menu lists the studies and measurements for an exam category. The studies and measurements are organized in a hierarchy, in the same order that they are organized on the Top/Sub Menu while doing measurements. The following example shows the highest level of the Obstetrics exam category, with the OB studies listed.


Obstetrics
Generic
%Stenosis
A/B Ratio
Caliper
Ellipse
Area (trace)
Volume
Angle
VF Diam
2D VCR calib
MM VCR calib
Dop. VCR calib
Spline trace
Intensity
OB-1
OB-2/3
OB-General
Fetal Heart
OB/GYN Vessel
Measure
About
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
Delete measure and folder
Factory
Edit Calc
Folder
Exit

● 2D
○ MM
○ Dop.

Name: Generic

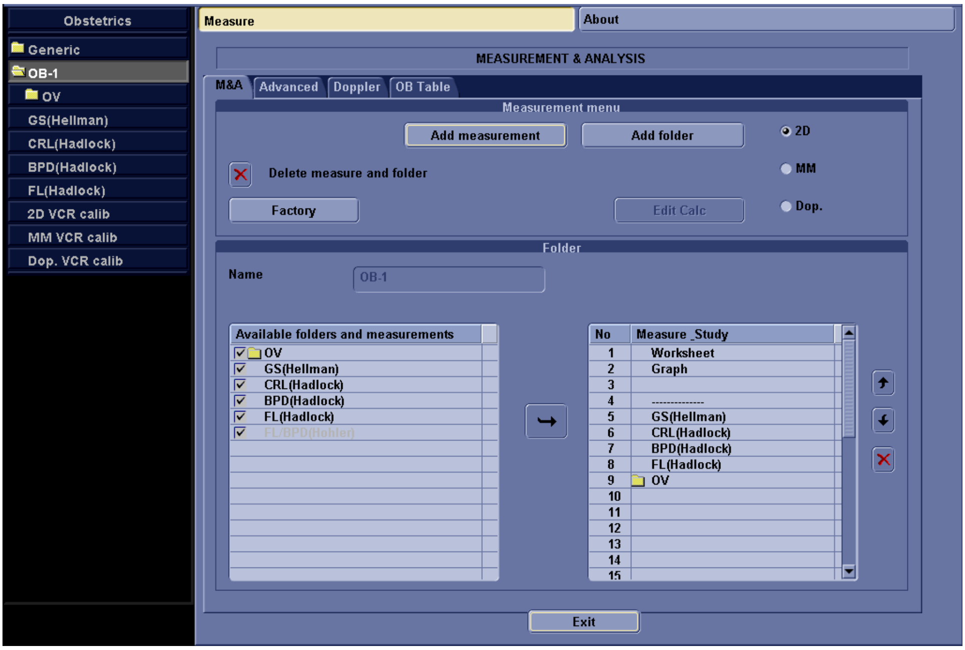
Available folders and measurements
- ☑ %Stenosis
- ☑ A/B Ratio
- ☑ Caliper
- ☑ Ellipse
- ☑ Area (trace)
- ☑ Volume
- ☑ Angle
- ☑ Spline trace
- ☑ Intensity

No	Measure _Study
1	Generic Worksheet
2	
3	
4	--------------
5	%Stenosis
6	Volume
7	Angle
8	
9	
10	
11	
12	A/B Ratio
13	
14	
15	

Figure 7-8. Selection Menu: Exam Studies

Selecting a study or measurement (continued)

After you select a study, the Selection menu shows all folders and measurements in the study. The Folder section of the Measurement & Analysis screen changes, and lists the measurements. The Selection menu shows all measurements for the OB-1 exam category.


Obstetrics
Generic
OB-1
OV
GS(Hellman)
CRL(Hadlock)
BPD(Hadlock)
FL(Hadlock)
2D VCR calib
MM VCR calib
Dop. VCR calib
Measure
About
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
Delete measure and folder
Factory
Edit Calc
MM
Dop.
Folder
Exit

● 2D

Name: OB-1

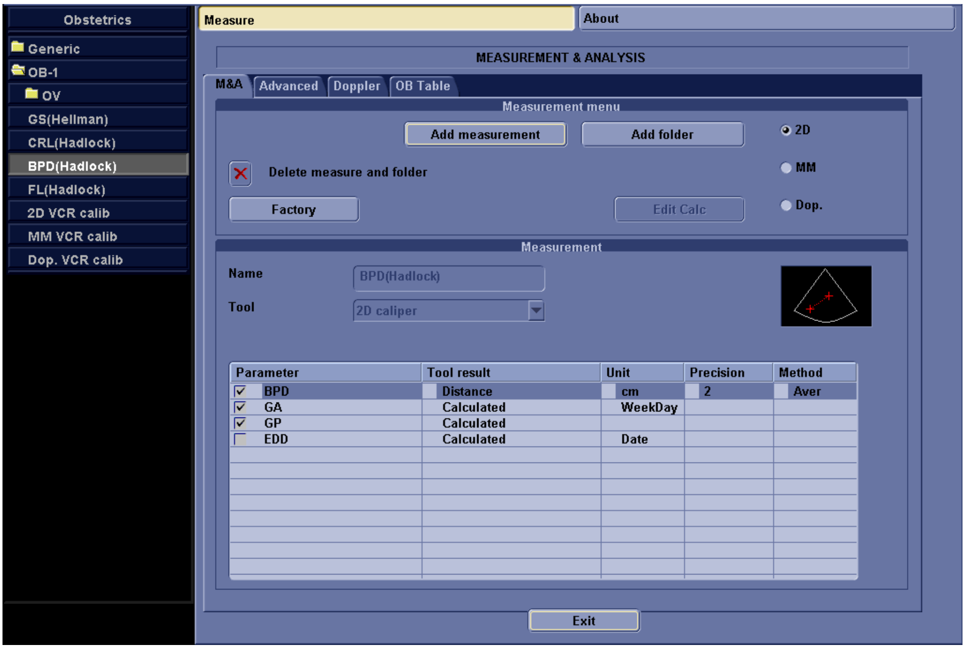
Available folders and measurements
☑ OV
☑ GS(Hellman)
☑ CRL(Hadlock)
☑ BPD(Hadlock)
☑ FL(Hadlock)
☑ FL/BPD(Hohler)

No	Measure _Study
1	Worksheet
2	Graph
3	
4	-------------
5	GS(Hellman)
6	CRL(Hadlock)
7	BPD(Hadlock)
8	FL(Hadlock)
9	OV
10	
11	
12	
13	
14	
15	

Figure 7-9. Selection Menu: OB-1 Exam Category

Selecting a study or measurement (continued)

The following example shows the Selection menu after the BPD measurement is selected. The Measurement section is now displayed, with information about the BPD measurement.


Obstetrics
Generic
OB-1
OV
GS(Hellman)
CRL(Hadlock)
BPD(Hadlock)
FL(Hadlock)
2D VCR calib
MM VCR calib
Dop. VCR calib
Measure
About
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
Delete measure and folder
Factory
Edit Calc
Measurement
Exit

● 2D
○ MM
○ Dop.

Name: BPD(Hadlock)

Tool: 2D caliper

Parameter	Tool result	Unit	Precision	Method
☑ BPD	Distance	cm	2	Aver
☑ GA	Calculated	WeekDay		
☑ GP	Calculated			
☐ EDD	Calculated	Date		

Figure 7-10. Selection Menu: BPD Measurement

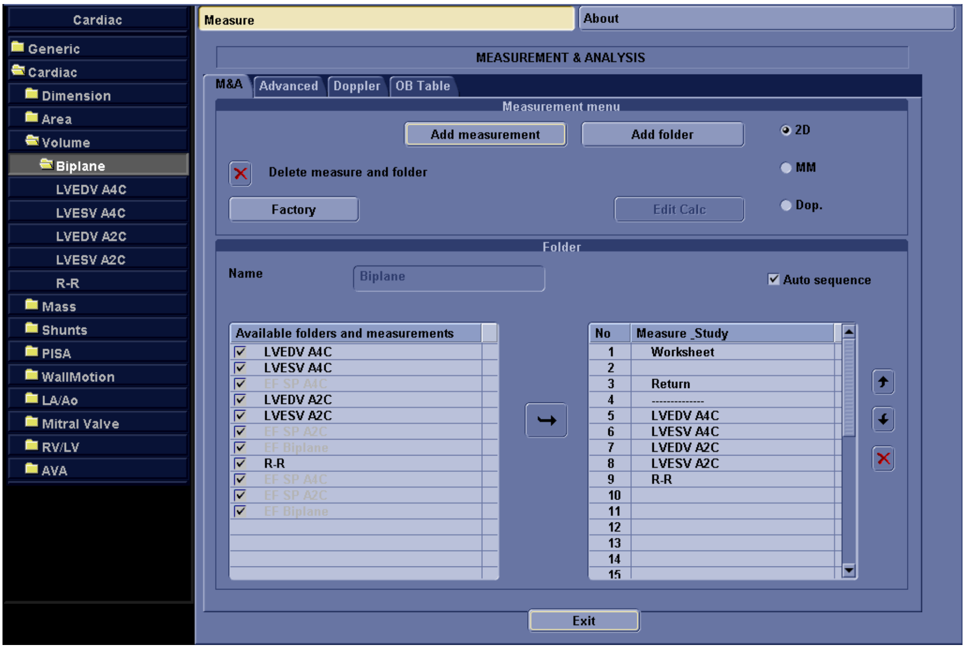
Selecting a study or measurement (continued)

To select a folder or measurement:

1. Move the **Trackball** to the Selection menu and highlight the folder or measurement.
2. Press **Set**.
   - If you selected a folder, the system displays the folder in the Folder section of the Measurement & Analysis screen.
   - If you selected a measurement, the system displays the measurement in the Measurement section of the Measurement & Analysis screen.

NOTE: Items must be selected in the Available folders and measurements list to be in the Selection menu. To move or change an item that is in the Available folders and measurements list but not in the Selection menu, move the ***Trackball*** *to the check box for the item, and press* ***Set****. The item is now listed in the Selection menu.*

Selecting a study or measurement (continued)


Cardiac
Generic
Cardiac
Dimension
Area
Volume
Biplane
LVEDV A4C
LVESV A4C
LVEDV A2C
LVESV A2C
R-R
Mass
Shunts
PISA
WallMotion
LA/Ao
Mitral Valve
RV/LV
AVA
Measure
About
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
Delete measure and folder
Factory
Edit Calc
Folder
Exit

● 2D
○ MM
○ Dop.

Name: Biplane

☑ Auto sequence

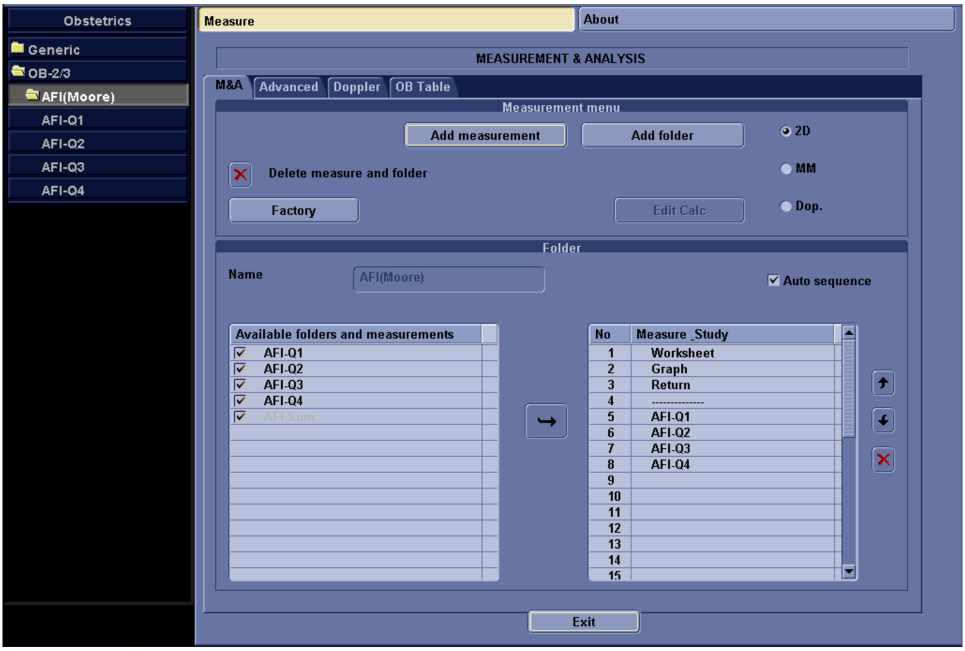
Available folders and measurements
☑ LVEDV A4C
☑ LVESV A4C
☑ EF SP A4C
☑ LVEDV A2C
☑ LVESV A2C
☑ EF SP A2C
☑ EF Biplane
☑ R-R
☑ EF SP A4C
☑ EF SP A2C
☑ EF Biplane

No	Measure _Study
1	Worksheet
2	
3	Return
4	-------------
5	LVEDV A4C
6	LVESV A4C
7	LVEDV A2C
8	LVESV A2C
9	R-R
10	
11	
12	
13	
14	
15	

Figure 7-11. Available folders and measurements check boxes

Using folders

When you select a folder in the Selection menu, the system displays all folders and measurements that are in the folder. A folder can indicate a study, or can indicate a measurement group that contains related measurements. For example, a calculation such as OB Amniotic Fluid Index (AFI) requires four measurements, one of each quadrant. The AFI folder contains four measurements.


Obstetrics
Generic
OB-2/3
AFI(Moore)
AFI-Q1
AFI-Q2
AFI-Q3
AFI-Q4
Measure
About
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
Delete measure and folder
Factory
Edit Calc
Folder
Exit

● 2D
○ MM
○ Dop.

Name: AFI(Moore)

☑ Auto sequence

Available folders and measurements
☑ AFI-Q1
☑ AFI-Q2
☑ AFI-Q3
☑ AFI-Q4
☑ AFI Sum

No	Measure _Study
1	Worksheet
2	Graph
3	Return
4	--------------
5	AFI-Q1
6	AFI-Q2
7	AFI-Q3
8	AFI-Q4
9	
10	
11	
12	
13	
14	
15	

Figure 7-12. AFI Folder

Specifying Which Measurements Go in a Study or Folder

The Folder section of the Measurement & Analysis screen has two lists of folders and measurements. This is where you specify which items go in a study or folder.

- **Available folders and measurements.** The left list contains all possible folders and measurements for the selected study or folder.
- **Selection Menu.** The list has all folders and measurements currently selected for the study or folder. These are selected from the available folders and measurements list. These are the folders and measurements you see when you are scanning and choose an exam category.

Setting up an automatic exam flow

In some cases, related measurements are put in a measurement folder. This allows you to logically organize measurements. It also allows you to specify that the system automatically start each measurement in a folder, one after the other. This is the automatic sequence feature. To use this feature:

1. In the Selection menu, select the folder that contains the measurements you want.

   The system displays the folder and lists the measurements.

2. In the Folder section of the Measurement & Analysis screen, select Auto sequence. For OB/GYN Vessel measurements, Umbilical Doppler measurements are put in the Umbilical measurement folder.

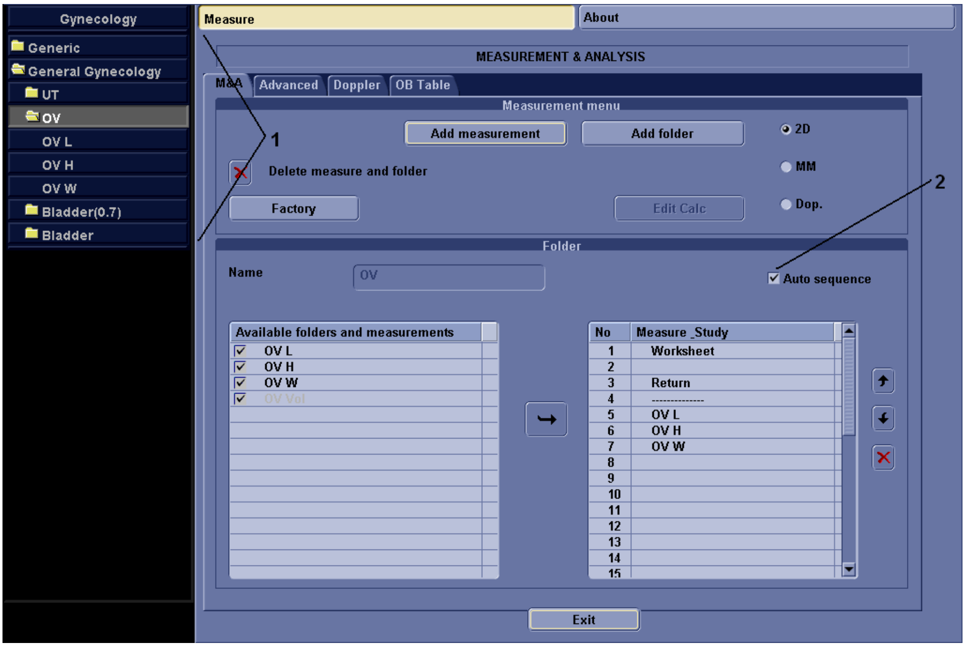

Gynecology
Generic
General Gynecology
UT
OV
OV L
OV H
OV W
Bladder(0.7)
Bladder
Measure
About
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
● 2D
○ MM
○ Dop.
Delete measure and folder
Factory
Edit Calc
Folder
Name
OV
☑ Auto sequence
Available folders and measurements
☑ OV L
☑ OV H
☑ OV W
☑ OV Vol
No
Measure _Study
1 Worksheet
2
3 Return
4 --------------
5 OV L
6 OV H
7 OV W
8
9
10
11
12
13
14
15
Exit
1
2

Figure 7-13. Measurement & Analysis screen: Auto sequence

1. Selection Menu
2. Auto Sequence

Changing Measurements

You can make changes to some of the measurements. For example, Head Circumference can be measured with an ellipse, a trace, or two distances. You can specify which measurement type you want the system to use as the default. You specify the measurement type by selecting the tool to use to make the measurement.

- To change the tool used to make a measurement:

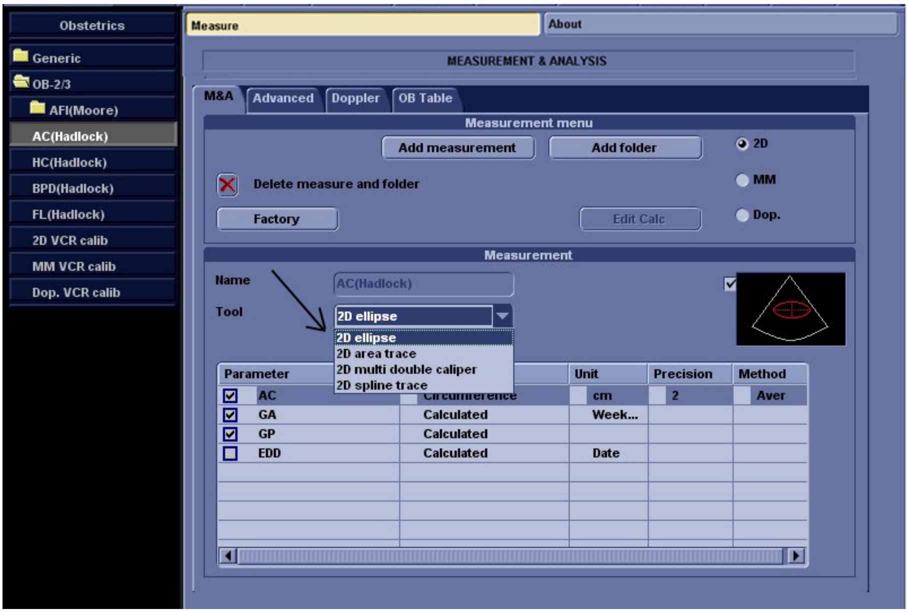
  In the Measurement section of the Measurement & Analysis screen, select the desired tool from the Tool list. Select the arrow to display the drop-down list.

NOTE: If the Tool field is gray, it cannot be changed.

After you choose the tool, this is what the system expects when you scan and choose this measurement.

NOTE: The diagram to the right of the Tool list shows the measurement type. In the following example, ellipse is selected and the diagram shows an ellipse.

Changing Measurements (continued)


Obstetrics
Generic
OB-2/3
AFI(Moore)
AC(Hadlock)
HC(Hadlock)
BPD(Hadlock)
FL(Hadlock)
2D VCR calib
MM VCR calib
Dop. VCR calib
Measure
About
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
● 2D
○ MM
○ Dop.
Delete measure and folder
Factory
Edit Calc
Measurement
2D ellipse
2D area trace
2D multi double caliper
2D spline trace

Name: AC(Hadlock)

Tool: 2D ellipse

Parameter		Unit	Precision	Method
☑ AC	Circumference	cm	2	Aver
☑ GA	Calculated	Week...		
☑ GP	Calculated			
☐ EDD	Calculated	Date		

Figure 7-14. Measurement & Analysis screen: Change measurements

1. Tool field: select the default tool used to make the measurement

Adding Folders and Measurements

Adding a folder

When you add a folder, it can be a study, or a measurement folder that includes related measurements.

1. In the Selection menu, select the study or folder where you want to add the folder.
2. In the Measurement menu section, select Add folder.
    - If you select Blank, the system adds a folder with a name such as USERDEFS1. It is listed in the Selection menu. See Figure 7-16.
    - If you want to use an existing folder, select Insert, and then select a folder from the list. The list includes all folders defined for the current exam category and selected mode. You cannot edit this folder.

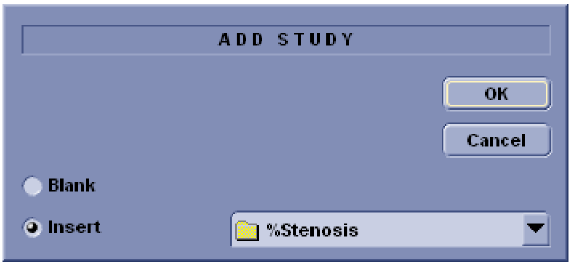
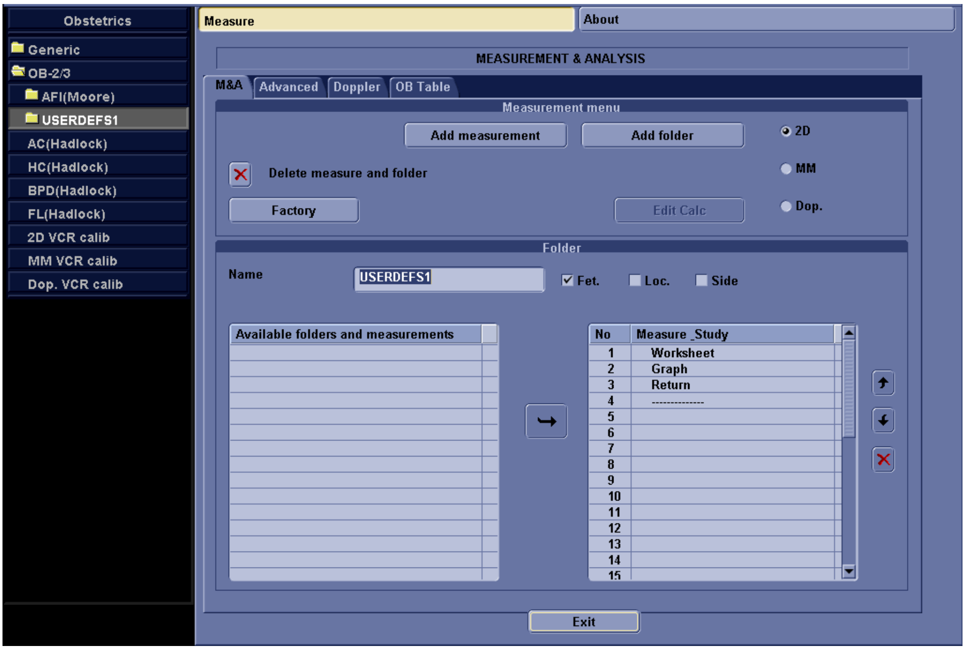


Figure 7-15. Add folder Window

3. Select the user-defined folder in the Selection menu.

   The system displays the new folder in the Folder section of the Measurement & Analysis screen.
4. To name the folder, move the **Trackball** to highlight the Name field, press **Set** twice, and type the name.
5. To add measurements to the folder, See ‘Adding a user-defined measurement’ on *page 7-31 for more information.*

Adding a folder (continued)


Obstetrics
Generic
OB-2/3
AFI(Moore)
USERDEFS1
AC(Hadlock)
HC(Hadlock)
BPD(Hadlock)
FL(Hadlock)
2D VCR calib
MM VCR calib
Dop. VCR calib
Measure
About
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
Delete measure and folder
Factory
Edit Calc
Folder
Available folders and measurements
No
Measure_Study
Exit

● 2D ○ MM ○ Dop.

Name: USERDEFS1 ☑ Fet. ☐ Loc. ☐ Side

No	Measure_Study
1	Worksheet
2	Graph
3	Return
4	--------------
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

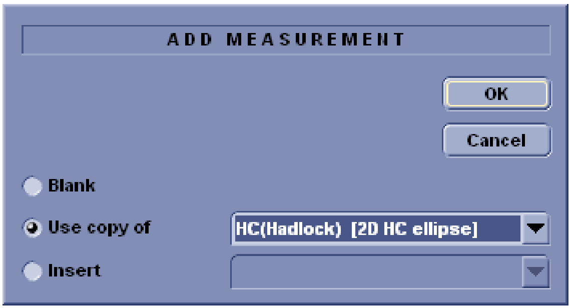
Figure 7-16. Measurement & Analysis: Add folder

Adding a user-defined measurement

You can create a user-defined measurement in a system-defined folder or in a folder you created.

1. In the Selection menu, select the study or folder where you want to add the measurement.
2. In the Measurement menu section, select Add measurement.

   The system displays the Add Measurement window.



● Use copy of HC(Hadlock) [2D HC ellipse]

Figure 7-17. Add Measurement window

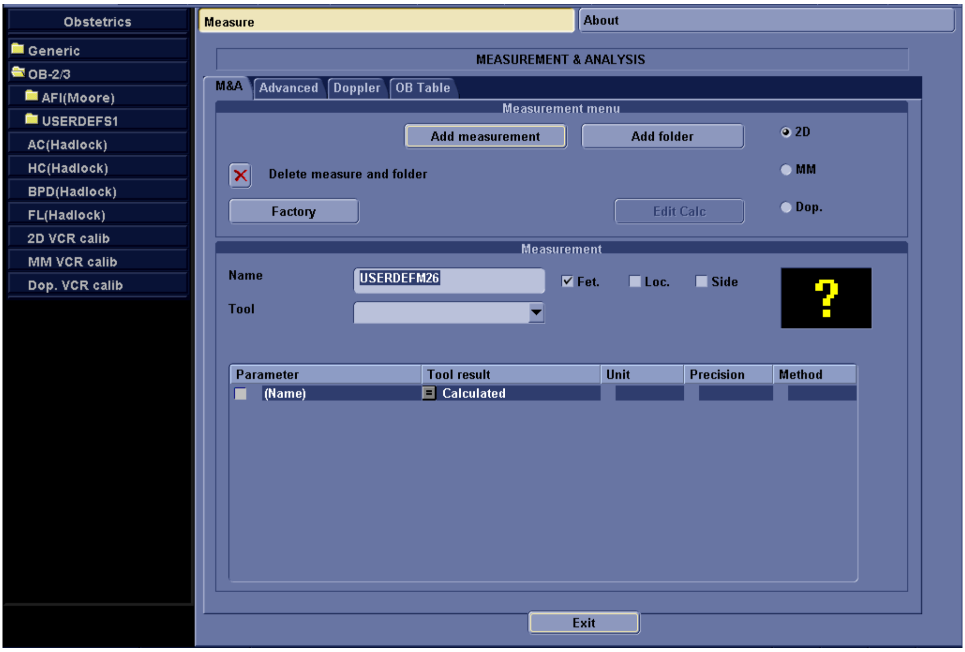
3. Do one of the following:
   - If you want to create this measurement from a copy of an existing measurement, select Use copy of, and then select a measurement from the list. The list includes all measurements defined for the current exam category and selected mode.

NOTE: *This only applies to OB and Cardiac.*

   - If you want to use an existing formula, select Insert, and then select a measurement from the list. The list includes all measurements defined for the current exam category and selected mode. You cannot edit this formula.
   - If you want to create a blank new measurement, select Blank.

Adding a user-defined measurement (continued)

4. Select OK.
   - If you created a blank measurement, the system adds a measurement with a name such as USERDEFM1.
   - If you created a measurement from a copy of an existing measurement, the system lists the measurement and its parameters in the Measurement section.
5. When you create a new measurement, the measurement name is automatically highlighted. Type a name for the new measurement. You can change the name of a measurement you created from a copy.


Obstetrics
Generic
OB-2/3
AFI(Moore)
USERDEFS1
AC(Hadlock)
HC(Hadlock)
BPD(Hadlock)
FL(Hadlock)
2D VCR calib
MM VCR calib
Dop. VCR calib
Measure
About
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
Delete measure and folder
Factory
Edit Calc
MM
Dop.
Measurement
Loc.
Side
?
Exit

● 2D

Name: USERDEFM26

☑ Fet. ☐ Loc. ☐ Side

Tool:

Parameter	Tool result	Unit	Precision	Method
☐ (Name)	Calculated			

Figure 7-18. Measurement & Analysis: Add measurement

Defining measurement parameters

After you add a measurement, you can add parameters. You may also want to change parameters if you copied an existing measurement. See 'Changing or adding measurement parameters' on *page 7-33 for more information.*

Changing or adding measurement parameters

You can make changes to measurement parameters and you can add measurement parameters.

Changing measurement parameters

To change a measurement parameter:

1. In the Selection menu, select the measurement.
2. To change the name of the Parameter, move the **Trackball** to the parameter name and press **Set** three times. Type a name for the parameter.

For a description of other measurement changes, See 'Changing Measurements' on *page 7-27 for more information.*

Adding measurement parameters

To add a measurement parameter:

1. In the Selection menu, select the measurement.
2. To change the tool used to make a measurement:

   In the Measurement section of the Measurement & Analysis screen, select the desired tool from the Tool list. Select the arrow to display the drop-down list.

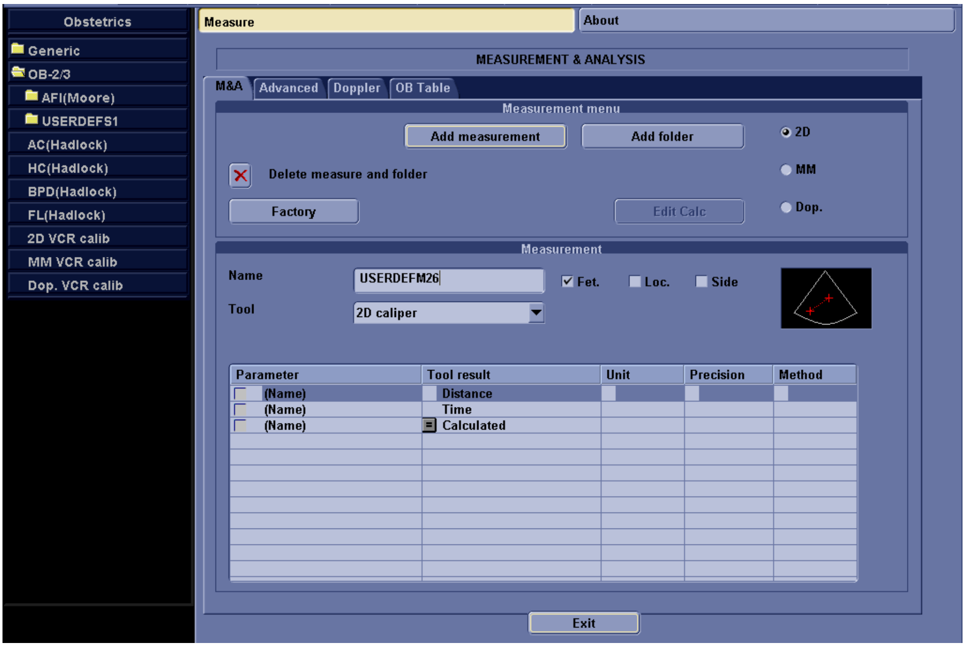
NOTE: If the Tool field is gray, it cannot be changed.

3. If necessary, check Fetus (OB only), Location (Loc), or Side:
   - Fetus: If this is an OB measurement, check this box. (Default ON).
   - Location: If this measurement includes a Prox, Mid, or Dist location, check this box.
   - Side: If this measurement includes a Left or Right side, check this box.

Adding measurement parameters (continued)

4. In the Measurement section, move the **Trackball** to an empty line at the bottom of the Parameter list. Press **Set**.

   The system adds a parameter with a name of (Name).


Obstetrics
Generic
OB-2/3
AFI(Moore)
USERDEFS1
AC(Hadlock)
HC(Hadlock)
BPD(Hadlock)
FL(Hadlock)
2D VCR calib
MM VCR calib
Dop. VCR calib
Measure
About
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
Delete measure and folder
Factory
Edit Calc
Measurement
Exit

● 2D ○ MM ○ Dop.

Name: USERDEFM26 ☑ Fet. ☐ Loc. ☐ Side

Tool: 2D caliper

Parameter	Tool result	Unit	Precision	Method
☐ (Name)	Distance			
☐ (Name)	Time			
☐ (Name)	Calculated			

Figure 7-19. Adding a Parameter

Adding measurement parameters (continued)

5. To change the name of the Parameter, move the Trackball to the (Name) and press **Set** twice. Type a name for the parameter.
6. Move the **Trackball** to the Tool result field, and press **Set** once.

   The Edit Formula window is displayed.

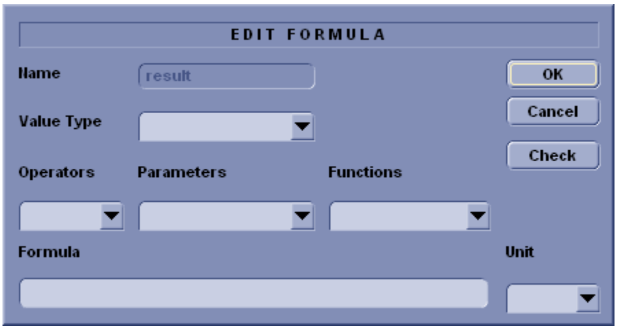


Figure 7-20. Edit Formula

7. To create a formula:
   a. In the Value Type field, select a value.
   b. Do one of the following:
   - Type a formula in the Formula field.
   - Select formula components from the Operators, Parameters, and Functions drop-down lists. When you select a component, the system displays it in the Formula field.
8. To test the formula, select Check.

   If there are no problems, the system displays “Syntax OK!”.

   If there are any problems with the formula, the system displays an Error message in place of the Formula field label.
9. When the formula is correct, select OK to save it.

   The Edit Formula window closes. The formula is displayed in the Tool result field.

Formula Unit Conversion

When you create a formula, the system changes the calculation result into an output unit as defined in the following table.

Table 7-2: Formula Unit Conversion

Unit		Conversion (coefficient value)
Time		
	s	x1
	ms	x1,000
	min	x0.0167
	h	x0.00027778
Ratio		
	%	x100
Frequency		
	bpm or BPM	x1.0
Angle		
	rad	x1.0
	deg	x57.2958
	grad	x63.6620
Distance		
	cm	x100
	m	x1
	dm	x10
	mm	x1,000
	inch	x39.37
	feet	x39.37
	pixels	x1
Velocity		
	m/s	x1
	dm/s	x10
	cm/s	x100
	mm/s	x1,000
	inch/s	x39.37
Acceleration		

Table 7-2: Formula Unit Conversion

Unit		Conversion (coefficient value)
	m/s2	x1
	dm/s2	x10
	cm/s2	x100
	mm/s2	x1,000
	inch/s2	x39.37
Area		
	m2 or m^2	x1
	dm2	x100
	cm2 or cm^2	x10,000
	mm2 or mm^2	x1,000,000
	inch2	x1550
Volume		
	m3	x1
	dm3	x1,000
	cm3	x1,000,000
	l	x1,000
	dl	x10,000
	cl	x100,000
	ml	x1,000,000
	gallon	x264,178
	quart	x1056.71
Volume Flow		

Table 7-2: Formula Unit Conversion

Unit		Conversion (coefficient value)
	m3/s	x1
	dm3/s	x1,000
	cm3/s	x1,000,000
	l/s	x1,000
	dl/s	x10,000
	cl/s	x100,000
	ml/s	x1,000,000
	m3/min	x60
	dm3/min	x60,000
	cm3/min	x60,000,000
	l/min or L/min	x60,000
	dl/min	x600,000
	cl/min	6,000,000
	ml/min	x60,000,000
	ml/m2	x1,000,000
Pressure		
	mmHg	x1
	Pa	x133.322
	kPa	x0.133322
	bar	x0.00133322
Pressure/Time		
	mmHg/s	x1
Mass		
	kg	x1
	g	x1,000
	ounce	x35.273962
	pound	x2.2046226
Others		
	mmHG	x100

Formula Unit Conversion (continued)

For example, when a Volume formula is created:

Vol [ml or cm3] = 0.523598*{D1}*{D2}*{D3}

(D1, D2, and D3 indicate a measurement result.)

In this case, the measurement (D1, D2, and D3) is a distance measurement, so the measured data is a meter [m] unit according to the above table.

To change into a milliliter, the system multiplies each measurement value by 100. As a result, it multiplies a formula by 1,000,000.

The standard unit of volume is a cube meter, so the system multiplies the result by 1,000,000.

The system multiplies the calculation result by the coefficient and converts it. To get a correct result, when you define the formula, you must convert the coefficient itself, such as the coefficient of 10^.

For example, if you want to define the following formula:

efg[g] = 10^(1.5662-0.0108*{P1}+0.0468*{P2}+0.171*{D1}+0.00034*{P1}*{P1}-0.003685*{P2}*{D1})

D1[cm]: Distance

P1[cm]: Perimeter

P2[cm]: Perimeter

Formula Unit Conversion (continued)

The system defines the standard value of each measurement as a meter [m]. If the unit of each measurement value of this formula is defined as centimeter [cm], you must define the formula as follows:

efw[g] = 10^(1.5662-0.0108*{P1}*100 + 0.0468*{P2}*100 + 0.171*{D1}*100 + 0.00034*{P1}*{P1}*100*100 - 0.003685*{P2}*{D1}*100*100)

(This converts each measurement value to a centimeter [cm], since the system standard unit is a meter [m].)

The output unit of this formula is a gram. Since the standard unit of the system is defined as a kilogram [kg], the system multiplies the output by 1,000.

Because the output of this formula is defined as a gram, it is necessary to define the formula as follows.

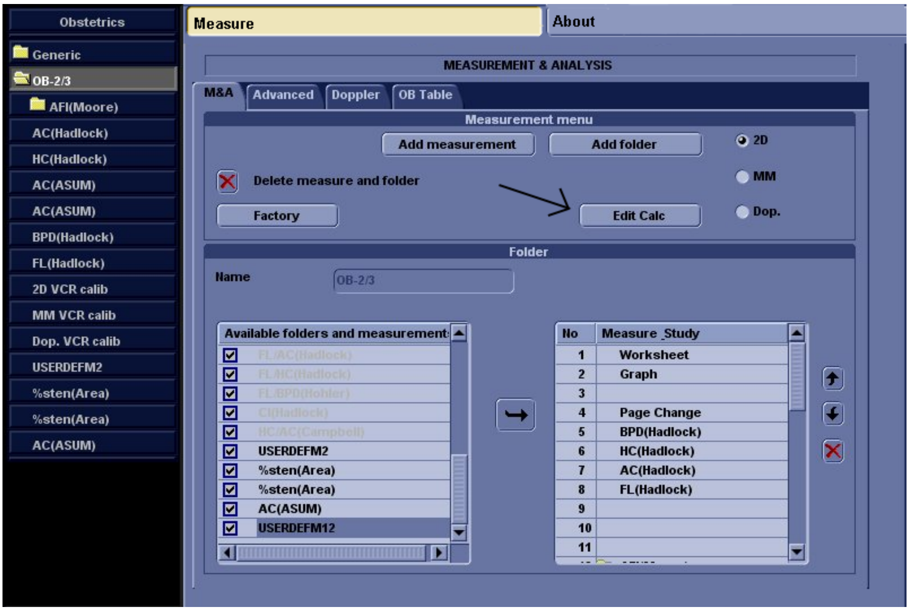
efw[g] = 10^(1.5662-0.0108*{P1}*100 + 0.0468*{P2}*100 + 0.171*{D1}*100 + 0.00034*{P1}*{P1}*100*100 - 0.003685*{P2}*{D1}*100*100)/1,000

As shown, you can obtain an exact calculation result.

Editing Calculations

To modify user-defined calculations:

In the Measurement menu section, selection Edit Calc.


Obstetrics
Generic
OB-2/3
AFI(Moore)
AC(Hadlock)
HC(Hadlock)
AC(ASUM)
AC(ASUM)
BPD(Hadlock)
FL(Hadlock)
2D VCR calib
MM VCR calib
Dop. VCR calib
USERDEFM2
%sten(Area)
%sten(Area)
AC(ASUM)
Measure
About
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
Delete measure and folder
Factory
Edit Calc
Folder

● 2D ○ MM ○ Dop.

Name: OB-2/3

	Available folders and measurements
☑	FL/AC(Hadlock)
☑	FL/HC(Hadlock)
☑	FL/BPD(Hohler)
☑	CI(Hadlock)
☑	HC/AC(Campbell)
☑	USERDEFM2
☑	%sten(Area)
☑	%sten(Area)
☑	AC(ASUM)
☑	USERDEFM12

No	Measure_Study
1	Worksheet
2	Graph
3	
4	Page Change
5	BPD(Hadlock)
6	HC(Hadlock)
7	AC(Hadlock)
8	FL(Hadlock)
9	
10	
11	

Figure 7-21. Edit Calc

Editing Calculations (continued)

The Modify User CALC window is displayed.

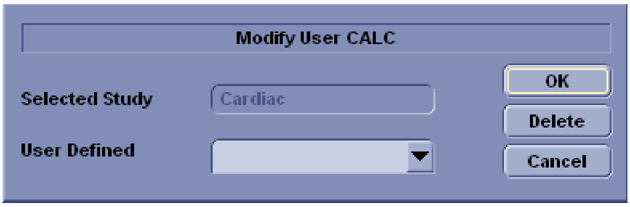
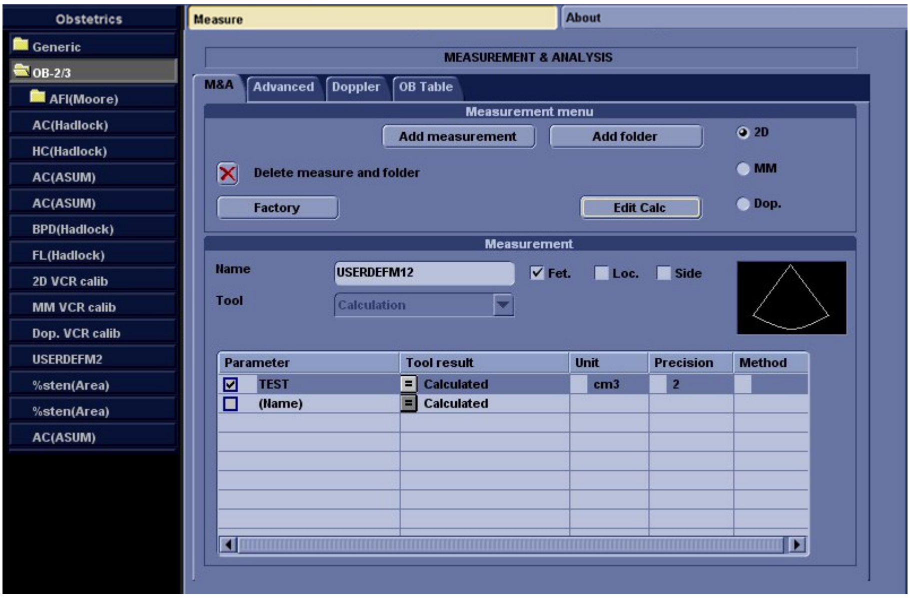

Modify User CALC
Selected Study
Cardiac
User Defined
OK
Delete
Cancel

Figure 7-22. Modify User CALC window

In the User Defined list, select the calculation that you want modified, then select OK.

Editing Calculations (continued)

The Measure tab for user-defined calculations is displayed.


Obstetrics
Generic
OB-2/3
AFI(Moore)
AC(Hadlock)
HC(Hadlock)
AC(ASUM)
AC(ASUM)
BPD(Hadlock)
FL(Hadlock)
2D VCR calib
MM VCR calib
Dop. VCR calib
USERDEFM2
%sten(Area)
%sten(Area)
AC(ASUM)
Measure
About
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
Delete measure and folder
Factory
Edit Calc
Measurement

● 2D
○ MM
○ Dop.

Name: USERDEFM12 ☑ Fet. ☐ Loc. ☐ Side

Tool: Calculation

Parameter	Tool result	Unit	Precision	Method
☑ TEST	Calculated	cm3	2	
☐ (Name)	Calculated			

Figure 7-23. Measurement & Analysis M&A tab

To modify calculations, See ‘Changing or adding measurement parameters’ on *page 7-33 for more information.*

Deleting a Folder or Measurement

NOTE: You can only delete user-defined folders or measurements. You cannot delete default system folders or measurements.

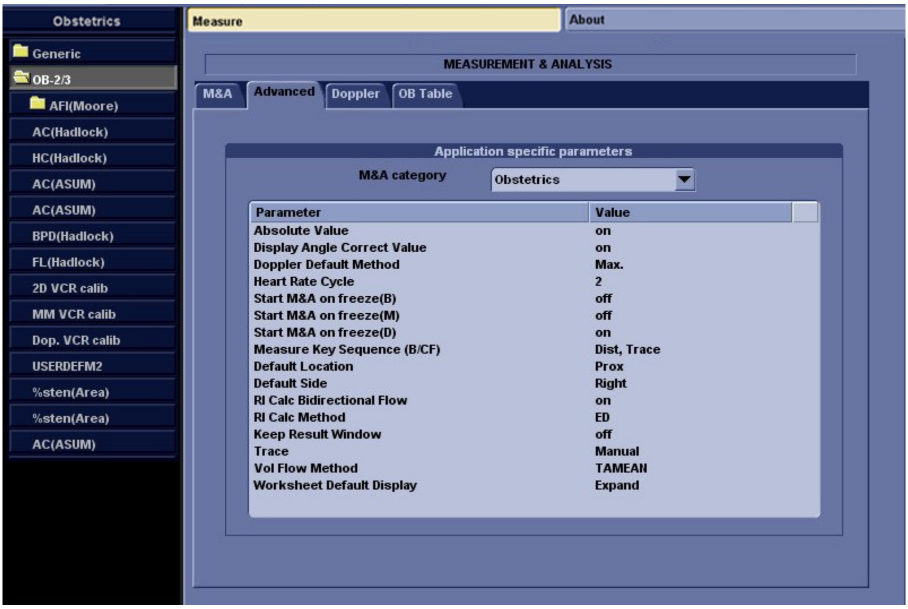
1. Select the folder or measurement in the Selection menu.
2. In the Measurement menu section, select the X next to Delete measure and study.

M&A Advanced Preset

The system allows you to specify application-specific values for certain parameters. You specify the parameter values on the Advanced tab of the Measurement & Analysis screen.

1. Press ***Utility***.

   The system displays the Utility screen on the monitor display.
2. Select ***Advanced***.
3. Select ***Measure***.
4. On the monitor display, select the Advanced tab.


Obstetrics
Generic
OB-2/3
AFI(Moore)
AC(Hadlock)
HC(Hadlock)
AC(ASUM)
AC(ASUM)
BPD(Hadlock)
FL(Hadlock)
2D VCR calib
MM VCR calib
Dop. VCR calib
USERDEFM2
%sten(Area)
%sten(Area)
AC(ASUM)
Measure
About
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Application specific parameters

M&A category: Obstetrics

Parameter	Value
Absolute Value	on
Display Angle Correct Value	on
Doppler Default Method	Max.
Heart Rate Cycle	2
Start M&A on freeze(B)	off
Start M&A on freeze(M)	off
Start M&A on freeze(D)	on
Measure Key Sequence (B/CF)	Dist, Trace
Default Location	Prox
Default Side	Right
RI Calc Bidirectional Flow	on
RI Calc Method	ED
Keep Result Window	off
Trace	Manual
Vol Flow Method	TAMEAN
Worksheet Default Display	Expand

Figure 7-24. M&A Advanced Preset Menu

M&A Category: Display and select current exam category.

Parameter: Lists application specific parameters.

Value: Select the value for a parameter.

M&A Advanced Preset (continued)

5. To select an exam category, select it from the M&A category list.

   The Parameters list displays parameters for the selected category.

6. To select a value for a parameter, select it from the Value list.

   - Doppler Default Method: Aveg., Max, Min or Last
   - Heart Rate Cycle: 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10
   - Start M&A on a Freeze: Off, On or Caliper

     Off: Select measurement manually on Freeze.

     On: Measurement menu appears automatically on Freeze.

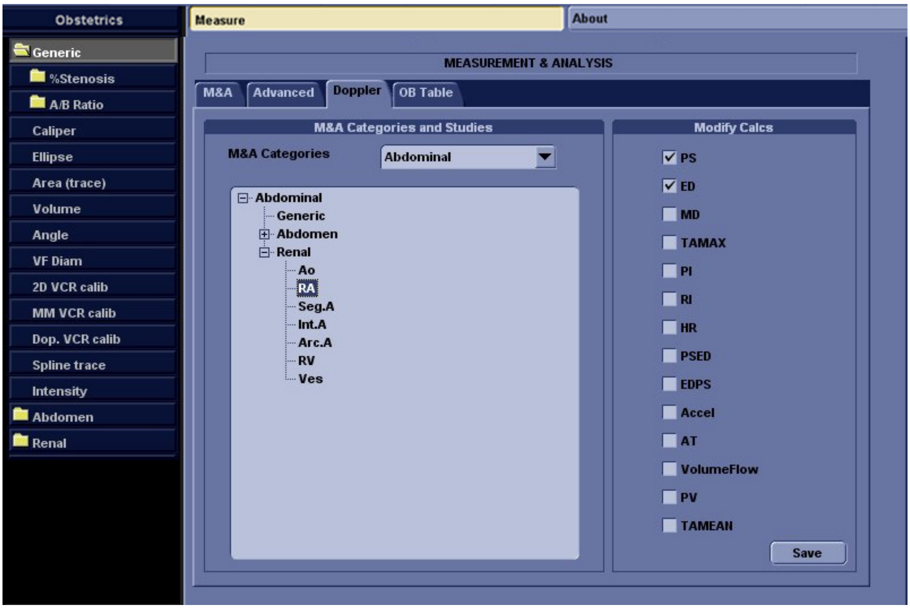
     Caliper: Measurement menu and caliper appear automatically on Freeze.
   - RI Calc Method: MD or ED
   - Trace: Auto or Manual
   - VOL Flow Method: TAMEAN or TAMAX

Manual Calcs Presets

The system allows you to preset the parameters for manual calculations. You specify the parameter values on the Doppler tab of the Measurement & Analysis screen.

1. Press ***Utility***.

   The system displays the Utility screen on the monitor display.
2. Select ***Advanced***.
3. Select ***Measure***.
4. On the monitor display, select the Doppler tab.


Obstetrics
Generic
%Stenosis
A/B Ratio
Caliper
Ellipse
Area (trace)
Volume
Angle
VF Diam
2D VCR calib
MM VCR calib
Dop. VCR calib
Spline trace
Intensity
Abdomen
Renal
Measure
About
MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
M&A Categories and Studies
Abdominal
Generic
Abdomen
Renal
Ao
RA
Seg.A
Int.A
Arc.A
RV
Ves
Modify Calcs
Save

M&A Categories: Abdominal

- ☑ PS
- ☑ ED
- ☐ MD
- ☐ TAMAX
- ☐ PI
- ☐ RI
- ☐ HR
- ☐ PSED
- ☐ EDPS
- ☐ Accel
- ☐ AT
- ☐ VolumeFlow
- ☐ PV
- ☐ TAMEAN

Figure 7-25. M&A Doppler Preset Menu

Manual Calcs Presets (continued)

5. To select an exam category, select it from the M&A category list.

   The system displays a hierarchical view of the exam category and the studies and folders in the category.
6. In the hierarchical view, select a study or folder.
7. In the Modify Calcs column, select the measurements that you want to the system to show for manual calcs for the selected study or folder.
8. To save the changes, select the Save button.

Mode Measurements

B-Mode Measurements

Two basic measurements can be made in B-Mode.

- Distance
- Circumference and Area
    - Ellipse Method
    - Trace Method
    - Spline Method

*NOTE: The following instructions assume that you first scan the patient and then press **Freeze**.*

Distance measurement

To make a distance measurement:

1. Press **Measure** once; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points, if preset accordingly.
5. To complete the measurement, press **Set**.

   The system displays the distance value in the Results Window.

The following hints can help you to perform distance measurements:

HINTS

- **Before** you complete a measurement:
  - To toggle between active calipers, press **Measure**.
  - To erase the second caliper and the current data measured and start the measurement again, press **Clear** once.
- **After** you complete the measurement:
  - To rotate through and activate previously fixed calipers, adjust **Cursor Select**.
  - To erase all data that has been measured to this point, but not data entered onto worksheets, press **Clear**.

Circumference and area (ellipse) measurement

You can use an ellipse to measure circumference and area. To measure with an ellipse:

1. Press **Measure** once; an active caliper displays.
2. To position the active caliper, move the **Trackball**.
3. To fix the start point, press **Set**. The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper, move the **Trackball**.
5. Adjust the **Ellipse** control; an ellipse with an initial circle shape displays.
6. To position the ellipse and to size the measured axes (move the calipers), move the **Trackball**.
7. To increase the size, adjust the **Ellipse** control in a clockwise direction. To decrease the size, adjust the **Ellipse** control in a counterclockwise direction.
8. To toggle between active calipers, press **Measure**.
9. To complete the measurement, press **Set**. The system displays the circumference and area in the Results Window.

HINTS

Before you complete the ellipse measurement:

- To erase the ellipse and the current data measured, press **Clear** once. The original caliper is displayed to restart the measurement.
- To exit the measurement function without completing the measurement, press **Clear** a second time.

Circumference and area (trace) measurement

Trace To trace the circumference of a portion of the anatomy and calculate its area:

1. Press **Measure** until a trace caliper displays.
2. To position the trace caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**. The trace caliper changes to an active caliper.
4. To trace the measurement area, move the **Trackball** around the anatomy. A dotted line shows the traced area.
5. To complete the measurement, press **Set**. The system displays the circumference and the area in the Results Window.

Open Trace To trace the circumference of a portion of the anatomy and calculate its length:

1. Press **Measure** until a trace caliper displays.

NOTE: *For open trace, Area (A) is not displayed in the result window.*

2. To position the trace caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**. The trace caliper changes to an active caliper.
4. To trace the measurement area, move the **Trackball** around the anatomy. A dotted line shows the traced area.
5. To complete the measurement, press **Set**. The system displays the circumference and the length in the Results Window.

HINTS

Before you complete the trace measurement:

- To erase the line (bit by bit) back from its current point, move the **Trackball** or adjust the **Ellipse** control counterclockwise.
- To erase the dotted line but not the trace caliper, press **Clear** once.
- To clear the trace caliper and the current data measured, press **Clear** twice.

Circumference and area (spline trace) measurement

To trace the circumference of a portion of the anatomy and calculate its area:

1. Press **Measure** until a trace caliper displays.
2. To position the first caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**. The first caliper turns yellow. The second caliper appears at the same position as the first caliper and is green.

*NOTE: When pressing the **Clear** key once, the second caliper disappears and the first caliper is activated.*

*If **Clear** is pressed again, the first caliper disappears and the Spline trace is cancelled.*

4. To position the second caliper, move the **Trackball** and press **Set**. The third caliper appears at the same position.

*NOTE: The **Clear** key functionality is the same as noted in the previous step.*

The spline trace requires at least three points to draw the trace. Continue setting the points of the trace until the desired points are set.

5. Press **Set** again after the last caliper is fixed to finalize the spline trace. All points are removed from the line and the spline trace turns yellow.

   Press **Set** twice to finish this measurement.

   If **Clear** is pressed twice when more than 3 points exist on the trace, all points are removed and the first caliper again displays.

NOTE: Spline trace is not available through the factory default. The system defaults to trace. To enable spline trace, modify the Measure Key Sequence preset found in Utility -> Measure -> Advanced preset menu.

Circumference and area (spline trace) measurement (continued)

Edit the spline trace

1. Select ***Cursor Select***. The spline trace changes to green and all points appear on the trace as yellow.

   A pick-caliper appears on the center of the image and the message “Edit spline trace” displays at the bottom of the screen.

NOTE: The pick-caliper is used to select and move the trace points.

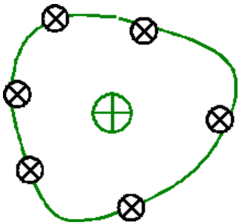


Figure 7-26. Edit spline trace

Select ***Cursor Select*** again. The trace is deactivated (changes to yellow) and all points, including the pick-caliper, are removed.

If the previous/next fixed caliper exists on the image, it is activated.

*NOTE: Pressing **Clear** at this time removes all points and the trace graphic.*

2. Move the pick-caliper to the desired point and press **Set**. The point is activated and turns green.
3. Move the point to the desired position and press **Set**. The point is fixed and turns yellow. The pick-caliper appears on the center of the image.

NOTE: The spline trace is updated at run time.

*NOTE: To remove a point, press **Clear** while moving the point. The trace turns green and the remaining points continue to be shown as yellow. If there are less than three points, the spline trace is removed.*

4. Press **Set** again. All points are removed from the trace and the trace is shown as yellow.

Doppler Mode Measurements

Four basic measurements can be made in Doppler Mode.

- Velocity
- TAMAX and TAMEAN (Manual or Auto Trace)
- Two Velocities with the Time Interval and Acceleration between them
- Time Interval

NOTE: The following instructions assume that you do the following:

1. In the B-Mode part of the display, scan the anatomy you want to measure.
2. Go to the Doppler Mode part of the display.
3. Press **Freeze**.

Velocity

To measure velocity:

1. Press **Measure**; an active caliper with a vertical dotted line displays.
2. To position the caliper at the desired measurement point, move the **Trackball**.
3. To complete the measurement, press **Set**. The system displays the velocity measurement in the Results Window.

TAMAX and TAMEAN

Manual Trace The value measured depends upon the Vol Flow Method preset. The two selections available are: Peak (TAMAX) and Mean (TAMEAN).

To do a manual trace of TAMAX or TAMEAN:

1. Press **Measure** twice; a trace caliper displays.
2. To position the caliper at the trace start point, move the **Trackball**.
3. To fix the start point, press **Set**.
4. To trace the maximum values of the desired portion of the spectrum, move the **Trackball**.

   NOTE: To edit the trace line, move the **Trackball**.
5. To complete the measurement, press **Set**. The system displays the measurement values in the Results Window.

Auto Trace The value measured depends upon the Vol Flow Method preset. The selection available is the Peak (TAMAX).

To auto trace TAMAX:

1. Press **Measure** twice; an active caliper with a vertical dotted line displays.
2. To position the caliper at the trace start point in the Doppler spectrum, move the **Trackball**.
3. To fix the start point, press **Set**.
4. To position the vertical caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**. The system automatically fixes both calipers and traces the maximum value between the two points. The system displays this value in the Results Window.

NOTE: *When you set the Auto Trace for Both (above and below), the system picks up the maximum power of the signal, NOT the maximum velocity. If the maximum velocity is not the maximum power, the system may not trace accurately. If you want to use maximum velocity, select either Above or Below.*

Edit Trace Auto Trace can be edited after taking an Auto Trace measurement.

1. After taking an Auto Trace measurement, select the measurement result on the result window. The Edit Trace (Edit Peak or Edit Mean) menu window appears.

NOTE: If the system cannot take the trace data correctly from the image, Edit Trace does not work.

2. Select Edit Trace. The first caliper (manual trace caliper) appears on the center of the image. Use the **Trackball** to move the caliper on the trace line to the start point.

*NOTE: To cancel Edit Trace at this time, press **Clear**, **Scan**, or **Freeze**.*

3. Press **Set** to fix the first caliper. The second caliper appears. Edit the trace manually using the second caliper.

   The Ellipse control is used to edit the trace.

*NOTE: When pressing the **Clear** key once at this time, the second caliper disappears and the first caliper appears in the center of the image.*

*NOTE: If you press **Scan** or **Freeze** at this time, the caliper is automatically fixed and the result window updates.*

4. Press **Set** to fix the second caliper. The trace and the result window update. The trace data (TAMAX and TAMEAN) are updated, though the other points (e.g. PS, ED) are not updated by trace. The points can be edited with ***Cursor Select***.

NOTE: While in Edit Trace, Cursor Select is disabled.

5. Repeat Edit Trace as needed.

Velocity, Time Interval and Acceleration

To measure two velocity values, the time interval (ms), and acceleration (m/s^2):

1. Press **Measure** three times; an active caliper with vertical and horizontal dotted lines displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**. The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**. The system displays the two peak end point velocities, the time interval, and the acceleration in the Results Window.

Time interval

To measure a horizontal time interval:

1. Press **Measure** four times; an active caliper with a vertical dotted line displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**. The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**. The system displays the time interval between the two calipers in the Results Window.

M-Mode Measurements

Basic measurements that can be taken in the M-Mode portion of the display are:

- Tissue Depth (Distance)
- Time Interval
- Time Interval and Velocity

NOTE: The following instructions assume that you do the following:

1. In the B-Mode part of the display, scan the anatomy you want to measure.
2. Go to the M-Mode part of the display.
3. Press **Freeze**.

Tissue depth

Tissue depth measurement in M-Mode functions the same as distance measurement in B-Mode. It measures the vertical distance between calipers.

1. Press Measure once; an active caliper with a vertical and horizontal dotted line displays.
2. To position the active caliper at the most anterior point you want to measure, move the Trackball.
3. To fix the start point, press Set.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the most posterior point you want to measure, move the Trackball.
5. To complete the measurement, press **Set**.

   The system displays the vertical distance between the two points in the Results Window.

Time interval

To measure a horizontal time interval and velocity:

1. Press **Measure** twice; an active caliper with a vertical dotted line displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**. The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**. The system displays the time interval between the two calipers in the Results Window.

Time interval and Velocity

To measure time and velocity between two points:

1. Press Measure three times; an active caliper with a vertical and horizontal dotted line displays.
2. To position the active caliper at the start point, move the Trackball.
3. To fix the start point, press Set.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the Trackball.
5. To complete the measurement, press Set.

   The system displays time(s) and slope between the two points in the Results Window.

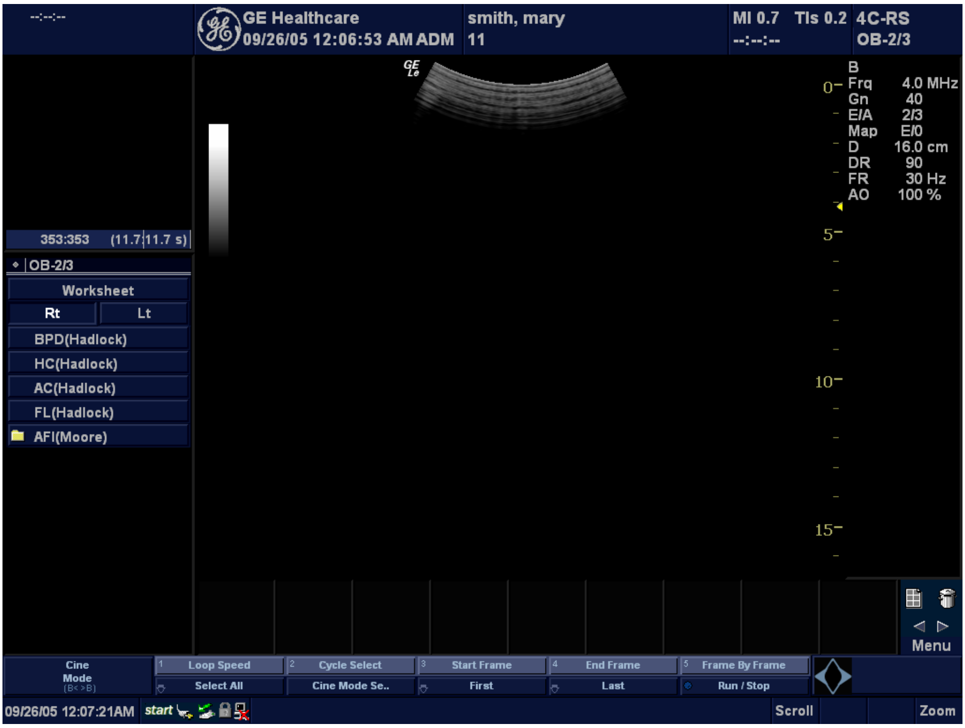
Viewing and Editing Worksheets

NOTE: Worksheets are not saved if the system crashes.

As you complete measurements, the system puts measurement data in the appropriate worksheets.

To view a worksheet

To view a worksheet, select ***Worksheet*** on the Top/Sub Menu.


GE Healthcare
09/26/05 12:06:53 AM ADM
smith, mary
11
MI 0.7 TIs 0.2 4C-RS
OB-2/3

B
Frq 4.0 MHz
Gn 40
E/A 2/3
Map E/0
D 16.0 cm
DR 90
FR 30 Hz
AO 100 %

353:353 (11.7|11.7 s)

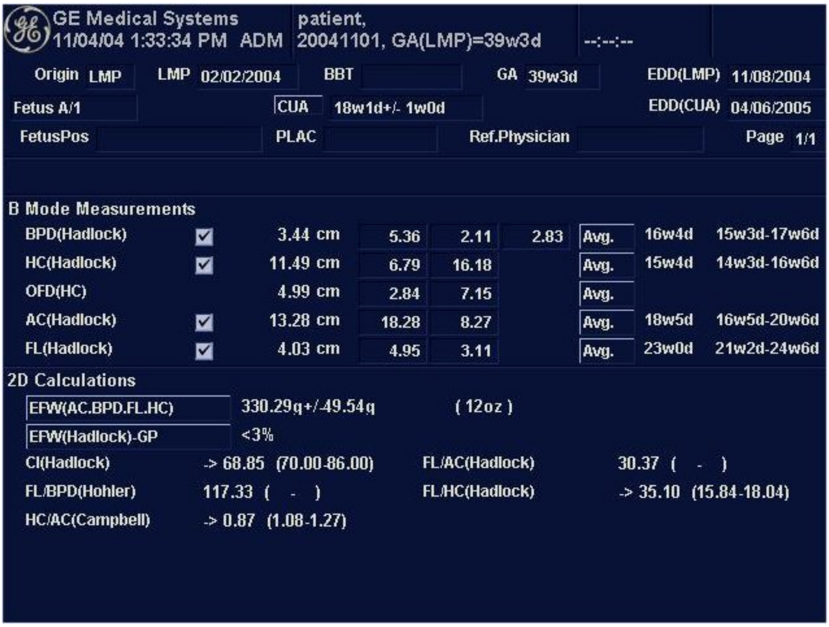
09/26/05 12:07:21AM

--:--:--
--:--:--
OB-2/3
Worksheet
Rt
Lt
BPD(Hadlock)
HC(Hadlock)
AC(Hadlock)
FL(Hadlock)
AFI(Moore)
0
5
10
15
Menu
Cine Mode (B<>B)
1 Loop Speed
Select All
2 Cycle Select
Cine Mode Se..
3 Start Frame
First
4 End Frame
Last
5 Frame By Frame
Run / Stop
start
Scroll
Zoom

Figure 7-27. OB-General Study

To view a worksheet (continued)

The system displays the worksheet for the current study.



GE Medical Systems
11/04/04 1:33:34 PM ADM

patient,
20041101, GA(LMP)=39w3d

--:--:--

Origin LMP

LMP 02/02/2004

BBT

GA 39w3d

EDD(LMP) 11/08/2004

Fetus A/1

CUA 18w1d+/- 1w0d

EDD(CUA) 04/06/2005

FetusPos

PLAC

Ref.Physician

Page 1/1

B Mode Measurements

BPD(Hadlock)	☑	3.44 cm	5.36	2.11	2.83	Avg.	16w4d	15w3d-17w6d
HC(Hadlock)	☑	11.49 cm	6.79	16.18		Avg.	15w4d	14w3d-16w6d
OFD(HC)		4.99 cm	2.84	7.15		Avg.		
AC(Hadlock)	☑	13.28 cm	18.28	8.27		Avg.	18w5d	16w5d-20w6d
FL(Hadlock)	☑	4.03 cm	4.95	3.11		Avg.	23w0d	21w2d-24w6d

2D Calculations

EFW(AC.BPD.FL.HC) 330.29g+/-49.54g (12oz)

EFW(Hadlock)-GP <3%

CI(Hadlock)	-> 68.85 (70.00-86.00)	FL/AC(Hadlock)	30.37 (-)
FL/BPD(Hohler)	117.33 (-)	FL/HC(Hadlock)	-> 35.10 (15.84-18.04)
HC/AC(Campbell)	-> 0.87 (1.08-1.27)		

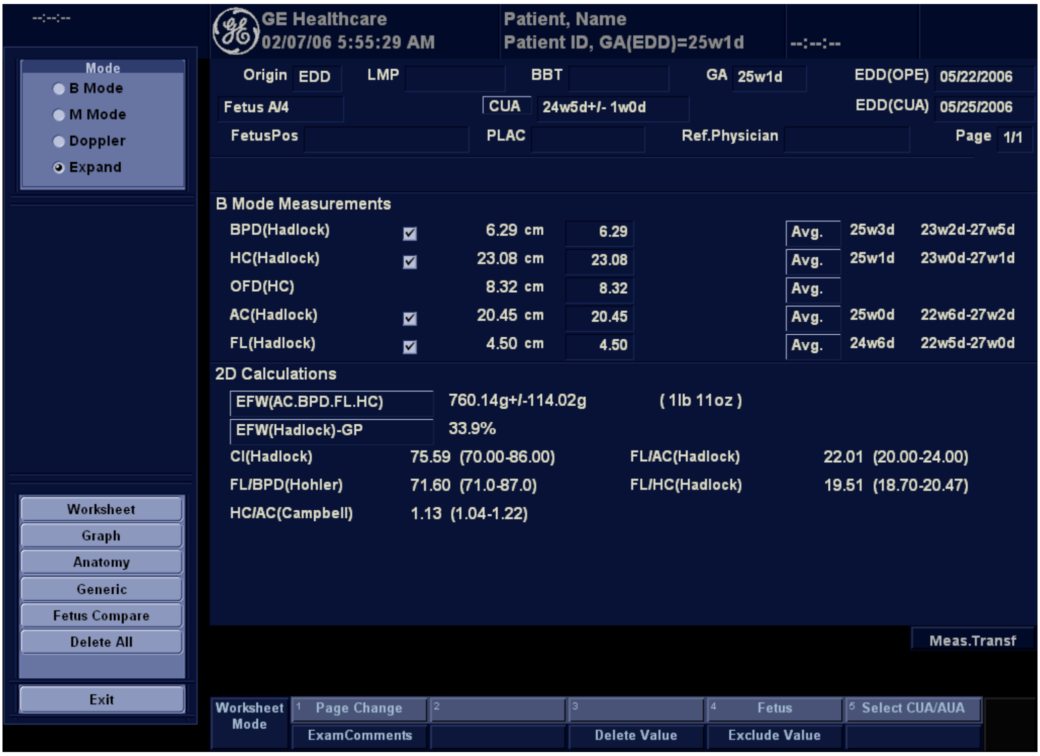
Figure 7-28. OB B-Mode Worksheet

To return to scanning, do one of the following:

- Select ***Worksheet***.
- Press ***Esc***.
- Select the *Exit* button.

To view a worksheet (continued)

To view a different worksheet, select the worksheet key for the desired worksheet.



--:--:--
GE Healthcare
02/07/06 5:55:29 AM
Patient, Name
Patient ID, GA(EDD)=25w1d
--:--:--
Mode
○ B Mode
○ M Mode
○ Doppler
● Expand
Worksheet
Graph
Anatomy
Generic
Fetus Compare
Delete All
Exit
Meas.Transf
Worksheet Mode
1 Page Change
2
3
4 Fetus
5 Select CUA/AUA
ExamComments
Delete Value
Exclude Value

Origin EDD
LMP
BBT
GA 25w1d
EDD(OPE) 05/22/2006
Fetus A/4
CUA 24w5d+/- 1w0d
EDD(CUA) 05/25/2006
FetusPos
PLAC
Ref.Physician
Page 1/1

B Mode Measurements

BPD(Hadlock)	☑	6.29 cm	6.29	Avg.	25w3d	23w2d-27w5d
HC(Hadlock)	☑	23.08 cm	23.08	Avg.	25w1d	23w0d-27w1d
OFD(HC)		8.32 cm	8.32	Avg.		
AC(Hadlock)	☑	20.45 cm	20.45	Avg.	25w0d	22w6d-27w2d
FL(Hadlock)	☑	4.50 cm	4.50	Avg.	24w6d	22w5d-27w0d

2D Calculations

EFW(AC.BPD.FL.HC) 760.14g+/-114.02g (1lb 11oz)
EFW(Hadlock)-GP 33.9%

CI(Hadlock)	75.59 (70.00-86.00)	FL/AC(Hadlock)	22.01 (20.00-24.00)
FL/BPD(Hohler)	71.60 (71.0-87.0)	FL/HC(Hadlock)	19.51 (18.70-20.47)
HC/AC(Campbell)	1.13 (1.04-1.22)		

Figure 7-29. Worksheet Display Top/Sub Menu: OB Study

To view worksheet data for a particular mode, select the key for that mode. To view a worksheet with data for more than one mode, select ***Expand***. When Expand is selected, it defaults to view all measurements, noted by mode, on the worksheet.

If a worksheet has more data on a second page, to view the next page, adjust the **Page Change** control.

To edit a worksheet

To change data on a worksheet:

1. To position the cursor at the field you want to change, move the **Trackball**. The field is highlighted.
2. Press **Set**.
3. Type the new data in the field. The new data is displayed in blue to indicate that it was manually entered.

To delete or exclude data on a worksheet:

1. To position the cursor at the field you want to delete or exclude, move the **Trackball**. The field is highlighted.
2. Do one of the following:
    - To delete the field, select ***Delete Value***.
    - To exclude the field, select ***Exclude Value***.

      The data in the field is not visible and is not included in worksheet calculations.
    - To include a value that you previously excluded, select ***Exclude Value***.

To type a comment on a worksheet:

1. Select ***Examiner’s Comments***. The Examiner’s Comments window opens.
2. Type comments about the exam.
3. To close the Examiner’s Comments window, select ***Examiner’s Comments***.

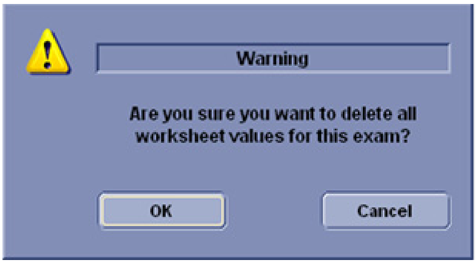
HINTS

Some fields on the worksheet are view only, and others you can change or select. To easily see which fields you can change or select, move the **Trackball**. As the cursor moves over a field that you can change or select, the field is highlighted.

Delete All Worksheet Values

You can delete all worksheet values on a worksheet.

1. When the Worksheet is displayed on the monitor, press the **Clear** key; the following warning message appears:



Warning

Are you sure you want to delete all worksheet values for this exam?

Figure 7-30. Delete All Warning Message

2. Select ***OK*** to delete all.

   Select ***Cancel*** to cancel the deletion.

Transferring Patient Data to a PC

After you perform a scan, you can send the patient and measurement data to a PC that accepts patient data.

NOTE: *To send the data, the LOGIQ e must be connected to the PC using a serial interface.*

On the Worksheet or Patient Data or Exam History screen, in the Exam Information section, select ***Meas. Transf.***

The system transfers the data. If there is a problem with the connection or transfer, the system displays an error message.

Generic Measurements

Overview

Each exam category has a Generic study. The Generic studies provide you quick access to measurements such as volume, angle, A/B ratio, and % stenosis. The particular measurements available in each Generic study vary, depending on the exam category and the mode. This section describes generic measurements, organized by mode.

To access Generic studies:

1. On the Control Panel, press **Measure**.
2. On the Top/Sub Menu, select the ***Generic*** folder.

Calculation formulas are available in the *Advanced Reference Manual*.

B-Mode Measurements

In B-Mode, the Generic study includes the following measurements:

- % Stenosis
- Volume
- Angle
- A/B Ratio

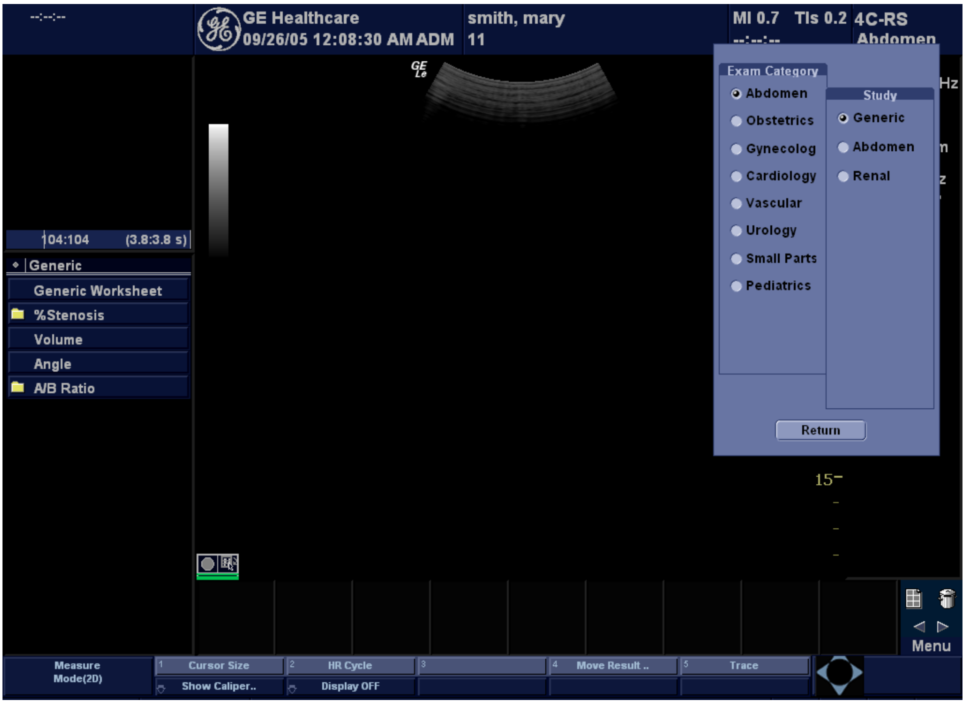

--:--:--
GE Healthcare
09/26/05 12:08:30 AM ADM
smith, mary
11
MI 0.7
TIs 0.2
4C-RS
--:--:--
Abdomen
104:104
(3.8:3.8 s)
Generic
Generic Worksheet
%Stenosis
Volume
Angle
A/B Ratio
Exam Category
● Abdomen
○ Obstetrics
○ Gynecolog
○ Cardiology
○ Vascular
○ Urology
○ Small Parts
○ Pediatrics
Study
● Generic
○ Abdomen
○ Renal
Return
15
Menu
Measure Mode(2D)
Cursor Size
HR Cycle
Move Result ..
Trace
Show Caliper..
Display OFF

Figure 7-31. B-Mode Generic Study

*NOTE: The following instructions assume that you first scan the patient and then press **Freeze**.*

% Stenosis

You can calculate % Stenosis by diameter or by area, depending on the mode.

NOTE: *The LOGIQ e automatically activates the % Stenosis with the default selection. If another method is preferred, select it from the Top/Sub Menu.*

Diameter

NOTE: *When you use diameter to calculate the %stenosis, always take the measurement from a cross-sectional view of the vessel.*

To calculate percent stenosis by diameter:

1. From the Generic Top/Sub Menu, select ***% Stenosis***.
2. Select ***%sten(Diam)***.

   The system displays an active caliper.
3. Make a distance measurement of the inner area of the blood vessel.

   The system displays an active caliper for the second distance measurement.
4. Make a distance measurement of the outer area of the blood vessel.

   The system displays each distance measurement and the % Stenosis in the Results Window.

For details on how to make a distance measurement, See ‘Distance measurement’ on *page 7-50 for more information..*

NOTE: *For the diameter calculation, do NOT take a distance measurement from a longitudinal view. This may lead to an inaccurate assessment of % stenosis.*

% Stenosis (continued)

Area To calculate percent stenosis by area:

1. From the Generic Top/Sub Menu, select ***% Stenosis***.
2. Select ***%sten(Area)***.

   The system displays a trace caliper.
3. Make a trace measurement of the inner area of the blood vessel.

NOTE: *To erase an open trace, move the **Trackball**.*

4. Press **Set**.

   The system displays a second trace caliper.
5. Make a trace measurement of the outer area of the blood vessel.

   The system displays the two area measurements and percent stenosis in the Results Window.

See ‘Circumference and area (trace) measurement’ on *page 7-52 for more information.*

Ellipse + Area To calculate percent stenosis by ellipse and area:

1. From the Generic Top/Sub Menu, select ***% Sten[E+A]*** folder.
2. Ellipse is selected by default.

   The system displays a trace caliper.

NOTE: *You can select the trace at this time.*

3. Make an ellipse measurement of the inner area of the blood vessel.
4. Press **Set**.

   The system displays a trace caliper.
5. Make a trace measurement of the outer area of the blood vessel.

   The system displays the two area measurements and percent stenosis in the Results Window.

NOTE: *% Stenosis (E+A) is not available through the factory default. To enable %Stenosis (E+A), add “%Steno(E+A)” to the Measure & Study list on the Utility -> Measure -> M&A screen.*

Volume

The volume calculation can be made from any of the following measurements:

- One distance
- Two distances
- Three distances
- One ellipse
- One distance and one ellipse

For details on how to make a distance measurement, See 'Distance measurement' on *page 7-50 for more information.*

For details on how to make an ellipse measurement, See 'Circumference and area (ellipse) measurement' on *page 7-51 for more information.*.

NOTE: IMPORTANT!! If you want to make a volume calculation using one or two distances, you must select ***Volume*** *BEFORE you make the measurements.*

NOTE: If you select Fix Caliper by Print Key on the Utility --> System --> System Measure, the print key does not function like the Set key, but instead ends the measurement sequence and initiates the volume calculation based on the number of measurements taken so far.

To make a volume calculation using one or two distances:

1. Select ***Volume***.
2. Make one or two distance measurements.
3. Select ***Volume***.

   The system displays the distances and the volume in the Results Window.

NOTE: Use the ***Clear*** *key to erase the green caliper.*

To make a volume calculation using three distances:

1. Make three distance measurements.

   NOTE: Three distances can be done in the dual format mode (side by side images). One measurement is usually made in the sagittal plane and two measurements in the axial plane. To use the dual format mode, press the ***L*** *or* ***R*** *key on front panel.*

2. Select ***Volume***.

   The system displays the distances and the volume in the Results Window.

Volume (continued)

To make a volume calculation using one ellipse:

1. Make one ellipse measurement.
2. Select ***Volume***.

   The system displays the ellipse measurement and the volume in the Results Window.

To make a volume calculation using one ellipse and one distance:

1. Make one distance measurement and one ellipse measurement.
2. Select ***Volume***.

   The system displays the distance and ellipse measurement and the volume in the Results Window.

HINTS

- Volumes are most accurate when measurements are taken in the sagittal and axial scan planes.
- To display sagittal and axial plane images simultaneously, use the side-by-side dual format option.

Calculation formulas are available in the *Advanced Reference Manual*.

Volume (continued)

Table 7-3: Volume Calculations

Calc Name	Input Measurements
Volume (spherical)	One distance
Volume (prolate spheroidal)	Two distances, d1>d2
Volume (spheroidal)	Three distances
Volume (prolate spheroidal)	One ellipse: (d1 major axis, d2 minor axis)
Volume (spheroidal)	One distance d1, and one ellipse (d2 major axis, d3 minor axis)

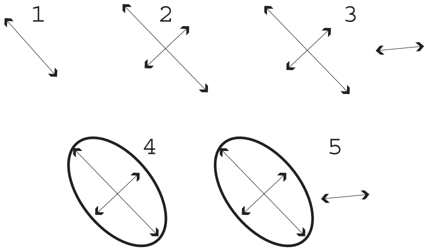


Figure 7-32. Volume Calculation Examples

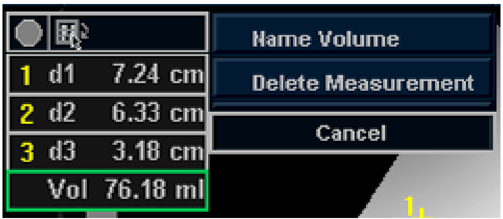
1. One distance
2. Two distances
3. Three distances
4. One ellipse
5. One distance and one ellipse

Volume (continued)

Post-assignment for General Volume

You can input a unique name for the general volume measurement. You can group the general volume measurements for each application.

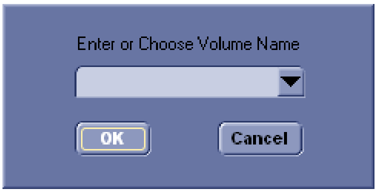
1. Complete the volume measurement.
2. Move the caliper to the measurement result box (with green frame) and select **Set**.
3. The volume name menu appears. Select Name Volume.



1 d1 7.24 cm
2 d2 6.33 cm
3 d3 3.18 cm
Vol 76.18 ml

Figure 7-33.   Volume Name menu

4. The dialog box displays. Enter a new name or choose the existing name.



Enter or Choose Volume Name

Figure 7-34.   Volume Name Dialog box

NOTE: *The factory default volume name cannot be changed (for example, Renal Volume).*

Angle

This function measures the angle between two intersecting planes.

1. From the Generic Top/Sub Menu, select ***Angle***.

   The system displays an active caliper.
2. To position the caliper, move the **Trackball**.
3. To fix the position of the first caliper, press ***Set***.

   The system displays a second active caliper.
4. To position the second caliper at the apex of the angle, move the **Trackball**.
5. To fix the position of the second caliper, press **Set**.

   The system displays a third active caliper.
6. To position the third caliper, move the **Trackball**.
7. To complete the angle measurement, press **Set**.

   The system displays the angle in the Results Window.

*NOTE: To rotate through and activate previously fixed calipers, adjust the **Cursor Select** control.*

A/B Ratio

In B-Mode, you can calculate A/B ratio by diameter or by area.

NOTE: *The LOGIQ e automatically activates the A/B Ratio with the default selection. If another method is preferred, select it from the Top/Sub Menu.*

Diameter To calculate A/B ratio by diameter:

1. From the Generic Top/Sub Menu, select ***A/B Ratio***.
2. Select ***ratio(Diam)***.

   The system displays an active caliper.
3. Make a distance measurement of the first diameter.

   The system displays an active caliper for the second distance measurement.
4. Make a distance measurement of the second diameter.

   The system displays each distance measurement and the A/B ratio in the Results Window.

NOTE: *The first distance is the A diameter. The second distance is the B diameter.*

For details on how to make a distance measurement, See ‘Distance measurement’ on *page 7-50 for more information.*

Area To calculate A/B ratio by area:

1. From the Generic Top/Sub Menu, select ***A/B Ratio***.
2. Select ***ratio(Area)***.

   The system displays a trace caliper.
3. Make a trace measurement of the A area.

NOTE: *To erase an open trace, move the **Trackball**.*

   The system displays a second trace caliper.

4. Make a trace measurement of the B area.

   The system displays the two area measurements and the A/B ratio in the Results Window.

For details on how to make a trace measurement, See ‘Circumference and area (trace) measurement’ on *page 7-52 for more information.*

M-Mode Measurements

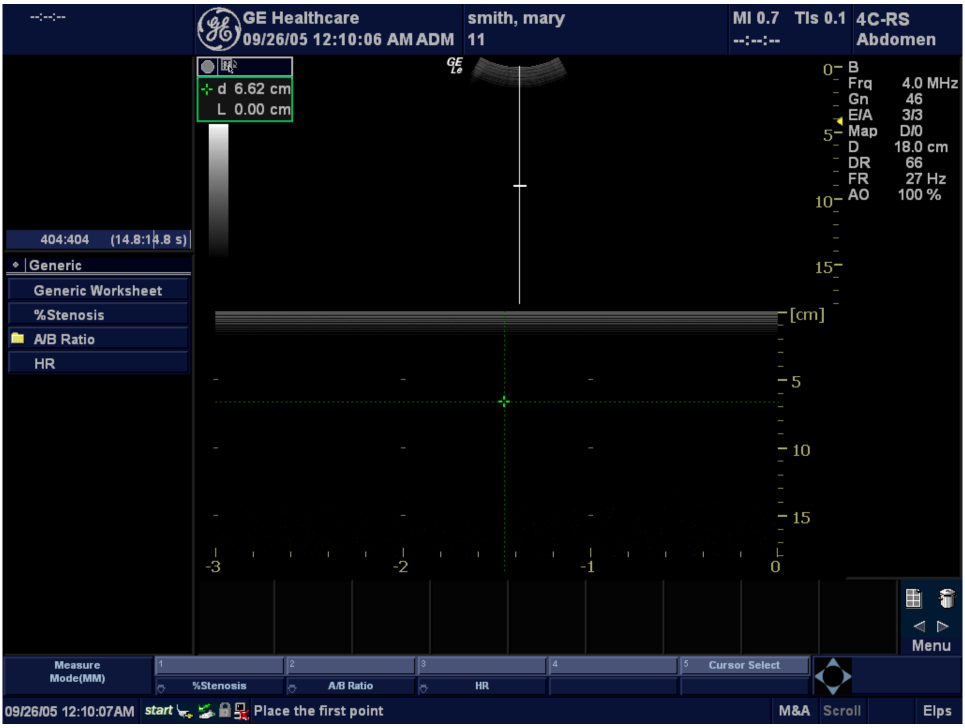

GE Healthcare
09/26/05 12:10:06 AM ADM
smith, mary
11
MI 0.7 TIs 0.1
4C-RS
Abdomen
d 6.62 cm
L 0.00 cm
404:404 (14.8:14.8 s)
Generic
Generic Worksheet
%Stenosis
A/B Ratio
HR
B
Frq 4.0 MHz
Gn 46
E/A 3/3
Map D/0
D 18.0 cm
DR 66
FR 27 Hz
AO 100 %
[cm]
Menu
Measure Mode(MM)
Cursor Select
09/26/05 12:10:07AM
start
Place the first point
M&A
Scroll
Elps

Figure 7-35. M-Mode Generic Study

% Stenosis

See '% Stenosis' on *page 7-69 for more information.*

A/B Ratio

In M-Mode you can measure A/B ratio by diameter, time, or velocity.

NOTE: *The LOGIQ e automatically activates the A/B Ratio with the default selection. If another method is preferred, select it from the Top/Sub Menu.*

Diameter See 'Diameter' on *page 7-76 for more information.*

Time To calculate A/B ratio by time:

1. Select ***A/B***.
2. Select ***ratio(Time)***.

   The system displays an active caliper.
3. To position the caliper at the A point, move the **Trackball**.
4. To fix the measure point, press **Set**.

   The system displays a second active caliper.
5. To position the second caliper at the B point, move the **Trackball**.
6. To complete the measurement, press **Set**.

   The system displays the two time measurements and A/B ratio in the Results Window.

Velocity To calculate AB ratio by velocity:

1. Select ***A/B***.
2. Select ***ratio(Velocity)***.

   The system displays an active caliper with vertical and horizontal dotted lines.
3. To position the caliper at the A velocity, move the **Trackball**.
4. To fix the measure point, press **Set**.

   The system displays a second active caliper.
5. To position the second caliper at the B velocity, move the **Trackball**.
6. To complete the measurement, press **Set**.

   The system displays the two velocity measurements and the A/B ratio in the Results Window.

Heart Rate

To calculate the heart rate from M-Mode:

1. Obtain an image and press Measure. Select ***HR***.

   The system displays an active caliper.
2. To position the caliper at a recognizable point in the first cycle, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the identical point in the next cycle (depending on preset), you need to move the **Trackball**.

NOTE: In the message bar at the bottom of the display, the system indicates the number of cycles you should measure.

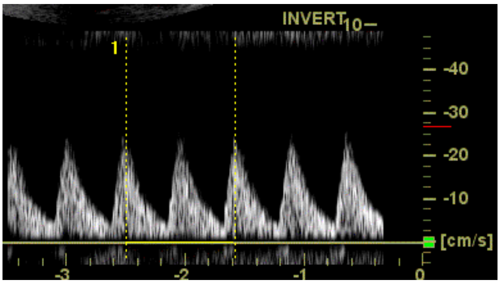


Figure 7-36. Two Heart Beat Reference (example in Doppler mode)

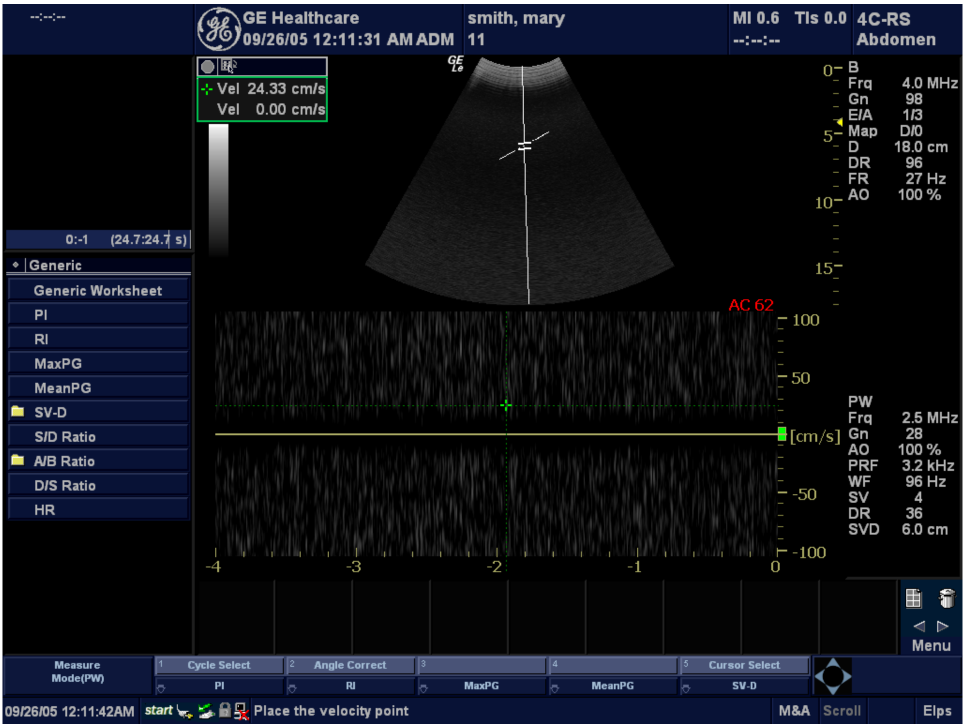
5. To complete the measurement and transfer the calculation to the worksheet, press **Set**.

NOTE: For information about how to specify the number of heart beats that the system will use, See 'Specifying measurement and display options' on page 7-10 for more information.

Doppler Mode Measurements

In Doppler Mode, the Generic study includes the following measurements:

- PI (Pulsatility Index)
- RI (Resistive Index)
- PS/ED Ratio or ED/PS Ratio
- A/B Ratio
- Max PG (Pressure Gradient)
- Mean PG (Pressure Gradient)
- SV (Stroke Volume)
- HR (Heart Rate)


GE Healthcare
09/26/05 12:11:31 AM ADM
smith, mary
11
MI 0.6 TIs 0.0
4C-RS
Abdomen
Vel 24.33 cm/s
Vel 0.00 cm/s
0:-1 (24.7:24.7 s)
Generic
Generic Worksheet
PI
RI
MaxPG
MeanPG
SV-D
S/D Ratio
A/B Ratio
D/S Ratio
HR
B
Frq 4.0 MHz
Gn 98
E/A 1/3
Map D/0
D 18.0 cm
DR 96
FR 27 Hz
AO 100 %
AC 62
PW
Frq 2.5 MHz
Gn 28
AO 100 %
PRF 3.2 kHz
WF 96 Hz
SV 4
DR 36
SVD 6.0 cm
[cm/s]
100
50
-50
-100
-4
-3
-2
-1
0
Menu
Measure Mode(PW)
Cycle Select
Angle Correct
Cursor Select
PI
RI
MaxPG
MeanPG
SV-D
09/26/05 12:11:42AM
start
M&A
Scroll
Elps

Place the velocity point

Figure 7-37. Doppler Mode Generic Study

Doppler Mode Measurements (continued)

NOTE: The following instructions assume that you do the following:

1. In the B-Mode part of the display, scan the anatomy you want to measure.
2. Go to the Doppler Mode part of the display.
3. Press **Freeze**.

Pulsatility Index (PI)

For auto trace:

1. Select ***PI***.

   The system displays a caliper and a vertical dotted line.
2. Position the caliper at the beginning of the waveform.
3. To fix the start point, press **Set**.

   The system displays a second active caliper.
4. Position the caliper at the end of the waveform.
5. To complete the measurement, press **Set**.

   The system displays peak systole, minimum diastole, end diastole, TAMAX, and PI in the Results Window.

For manual trace:

1. Select ***PI***.

   The system displays a trace caliper and a vertical dotted line.
2. Position the caliper at the beginning of the waveform.
3. To fix the start point, press **Set**.

   The system displays a second active caliper.
4. Manually trace the entire waveform.
5. To complete the measurement, press **Set**.

   The system displays peak systole, minimum diastole, end diastole, TAMAX, and PI in the Results Window.

Resistive Index (RI)

1. From the Doppler Generic Top/Sub Menu, select ***RI***.

   The system displays an active caliper with vertical and horizontal dotted lines.
2. To position the caliper at the peak systolic velocity, move the **Trackball**.
3. To fix the measure point, press **Set**.

   The system displays a second active caliper.
4. To position the second caliper at the end diastolic velocity, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays PS, ED, and RI in the Results Window.

PS/ED or ED/PS Ratio

To calculate the Peak Systole/End Diastole ratio or End Diastole/Peak Systole ratio:

1. Select ***PS/ED*** or ***ED/PS***.

   The system displays an active caliper with vertical and horizontal dotted lines.
2. To position the caliper at peak systole (PS) or end diastole (ED), move the **Trackball**.
3. To fix the measure point, press **Set**.

   The system displays a second active caliper.
4. To position the second caliper at end diastole (ED) or peak systole (PS), move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the peak systole, end diastole, and PS/ED or ED/PS ratio in the Results Window.

A/B Ratio

In Doppler Mode you can measure A/B ratio by velocity, time, or acceleration.

NOTE: The LOGIQ e automatically activates the A/B Ratio with the default selection. If another method is preferred, select it from the Top/Sub Menu.

Velocity See 'Velocity' on *page 7-78 for more information.*

Time See 'Time' on *page 7-78 for more information.*

Acceleration To measure A/B ratio by acceleration:

1. Select ***A/B***.
2. Select ***ratio(Acc)***.

   The system displays an active caliper.
3. Make a distance measurement of the A acceleration point.
   a. To position the active caliper at the start point, move the **Trackball**.

   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.

   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.

   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window and displays an active caliper for the second distance measurement.
4. To make a distance measurement of the B acceleration point, repeat steps a–d.

   The system displays the two acceleration measurements and the A/B ratio in the Results Window.

Max Pressure Gradient (PG)

To measure Max PG:

1. From the Doppler Generic Top/Sub Menu, select ***Max PG***.

   The system displays an active caliper with vertical and horizontal dotted lines.
2. To position the caliper at the first pressure gradient point, move the **Trackball**.
3. To fix the measure point, press **Set**.

   The system displays a second active caliper.
4. To position the second caliper at second pressure gradient point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the two V_{max} measurements and the Max PG in the Results Window.

Set the first caliper on V_{max} and the second on V_d.

Automatic Calculation of Max PG

When you select Max PG, if you previously measured and calculated velocity in Doppler Mode, the system automatically calculates Max PG from the V_{max} and V_d measurements taken for velocity.

Mean Pressure Gradient (PG)

To measure Mean PG (Mean Pressure Gradient):

1. From the Doppler Generic Top/Sub Menu, select ***Max PG***.

   The system displays a trace caliper.
2. To position the caliper at the beginning of the waveform (V_{max}), move the **Trackball**.
3. To fix the start point, press **Set**.

   The system displays a second active caliper.
4. To trace the waveform from V_{max} to V_d move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays TAMAX and Mean PG in the Results Window.

If Trace Auto is selected, the waveform is automatically traced after the second caliper is fixed.

If Trace Auto is not selected, manually trace the desired portion of the waveform.

Automatic Calculation of Mean PG

If velocity was previously measured and calculated in Doppler Mode, Mean PG is calculated from the velocity value when Mean PG is first selected in the Top/Sub Menu.

The waveform is automatically traced. Velocity and Mean PG are also displayed on the screen.

If Trace Auto is off, the Auto Trace function is off and traces can be performed manually.

Heart Rate

To measure heart rate, See ‘Heart Rate’ on *page 7-79 for more information.* or select any of the following measurements.

SV Diam (Stroke Volume Diameter)

To measure SV Diam:

1. From the Doppler Generic Top/Sub Menu, select the SV folder.
2. Select SV Diam.

SV TAMEAN (Stroke Volume TAMEAN)

To measure SV TAMEAN:

1. From the Doppler Generic Top/Sub Menu, select the SV folder.
2. Select SV TAMEAN.

CO HR (Cardiac Output Heart Rate)

To measure CO HR:

1. From the Doppler Generic Top/Sub Menu, select the SV folder.
2. Select CO HR.

Helpful hints

HINTS

The following hints can help when making a measurement

- Prior to making measurements, use the Cine function, if necessary, to display the best image.
- As you take measurements, each measurement is given a sequential number on the display and in the Results Window. Nine measurements can be displayed in the Results Window at one time.
- Once the Results Window has nine measurements, if you make any further measurements, the system erases the top (first) measurement and adds the new measurement last ("first in, first out").
- While you are taking a measurement, the value in the Results Window updates until you complete the measurement.

Chapter 8

Abdomen and Small Parts

Describes how to perform Abdomen and Small Parts measurements and calculations.

Abdomen/Small Parts Exam Preparation

Introduction

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements is not only determined by the system accuracy, but also by use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigators are so noted. Be sure to refer to the original article describing the investigator's recommended clinical procedures.

Calculation formulas are available in the *Advanced Reference Manual*.

General Guidelines

New Patient information must be entered before beginning an exam. See ‘Beginning a New Patient’ on *page 4-3 for more information.*

Any measurement can be repeated by selecting that measurement again from the Top/Sub Menu.

Abdomen

Introduction

Abdominal measurements offer a few different types of measurement studies:

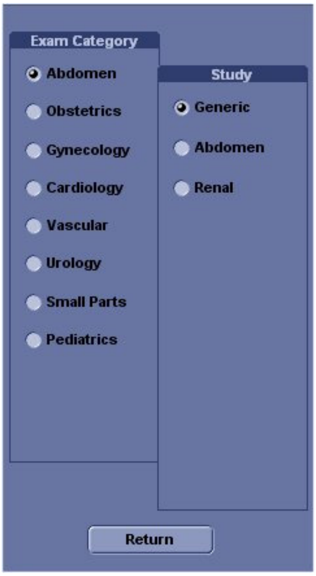

Exam Category
● Abdomen
○ Obstetrics
○ Gynecology
○ Cardiology
○ Vascular
○ Urology
○ Small Parts
○ Pediatrics
Study
● Generic
○ Abdomen
○ Renal
Return

Figure 8-1. Abdomen Exam Category Top/Sub Menu

- Generic–Common to all applications. See ‘Generic Measurements’ on *page 7-67 for more information.*
- Abdomen
- Renal

To change a study:

1. Press **Measure**.
2. Select the Top/Sub Menu key.

   The Abdomen exam category allows you to choose from the displayed studies.

B-Mode Measurements

The following measurements are located in the Exam Calcs for the Abdomen exam category. Some measurements are only available in certain Exam Calcs. Those specific measurements (splenic length, splenic width, splenic height, Aorta Diameter, and Renal Length) are listed on the following pages.

In B-Mode, the Generic Exam Calcs for Abdomen includes the following measurements:

- % Stenosis
- Volume
- Angle
- Renal Volume
- A/B Ratio

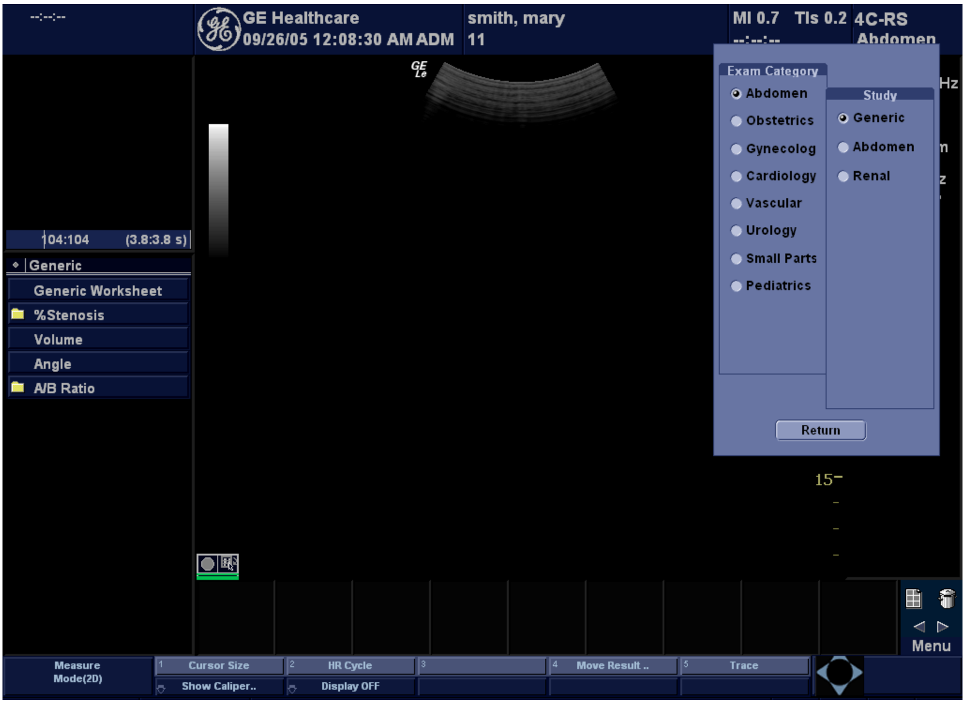

--:--:--
GE Healthcare
09/26/05 12:08:30 AM ADM
smith, mary
11
MI 0.7 TIs 0.2
4C-RS
Abdomen
Exam Category
Abdomen
Obstetrics
Gynecolog
Cardiology
Vascular
Urology
Small Parts
Pediatrics
Study
Generic
Abdomen
Renal
Return
104:104 (3.8:3.8 s)
Generic
Generic Worksheet
%Stenosis
Volume
Angle
A/B Ratio
15
Menu
Measure Mode(2D)
Cursor Size
Show Caliper..
HR Cycle
Display OFF
Move Result ..
Trace

Figure 8-2. Generic Calculations B-Mode Top/Sub Menu

See ‘B-Mode Measurements’ on *page 7-68 for more information.*

Aorta Diameter

This measurement is found in the Abdomen Exam Calcs. To measure aorta diameter, make one distance measurement:

1. Select **Aorta Diameter**; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the aorta diameter in the Results Window.

Renal Length

This measurement is found in the Renal Exam Calcs. To measure renal length, make one distance measurement:

1. Select the appropriate orientation (side): Right or Left.
2. Select **Renal Length**; an active caliper displays.
3. To position the active caliper at the start point, move the **Trackball**.
4. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
5. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points, if preset accordingly.
6. To complete the measurement, press **Set**.

   The system displays the renal length in the Results Window.

M-Mode Measurements

In M-Mode, all Exam Calcs include the following measurements:

- % Stenosis
- A/B Ratio
- Heart Rate

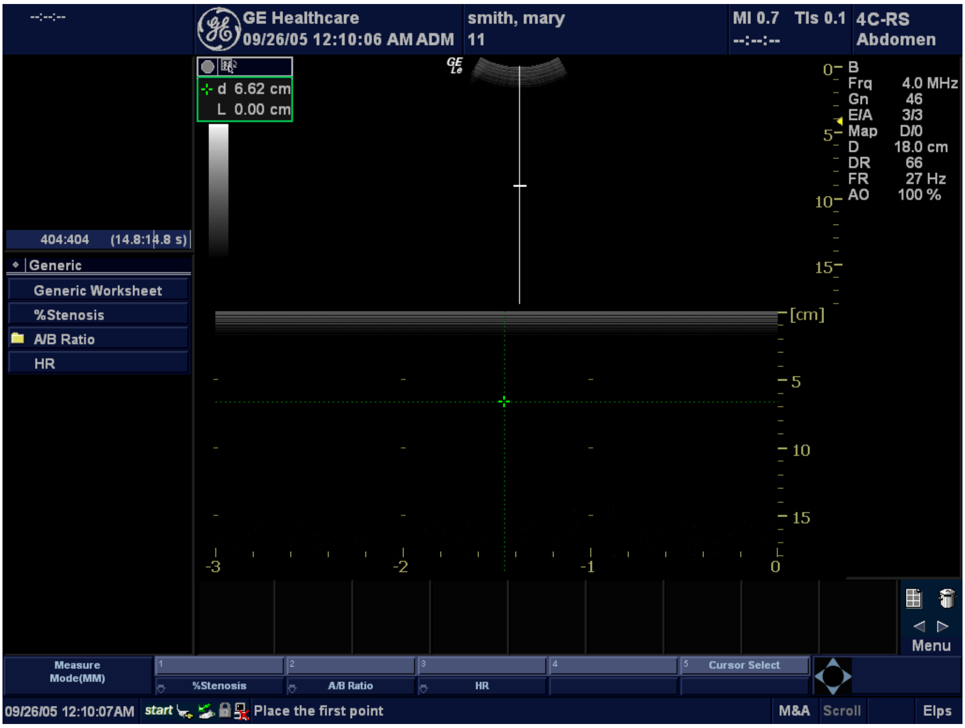

GE Healthcare
09/26/05 12:10:06 AM ADM
smith, mary
11
MI 0.7 TIs 0.1
4C-RS
Abdomen
d 6.62 cm
L 0.00 cm
404:404 (14.8:14.8 s)
Generic
Generic Worksheet
%Stenosis
A/B Ratio
HR
B
Frq 4.0 MHz
Gn 46
E/A 3/3
Map D/0
D 18.0 cm
DR 66
FR 27 Hz
AO 100 %
[cm]
Menu
Measure Mode(MM)
%Stenosis
A/B Ratio
HR
Cursor Select
09/26/05 12:10:07AM
start
Place the first point
M&A
Scroll
Elps

Figure 8-3. Abdomnal Calculations M-Mode Top/Sub Menu

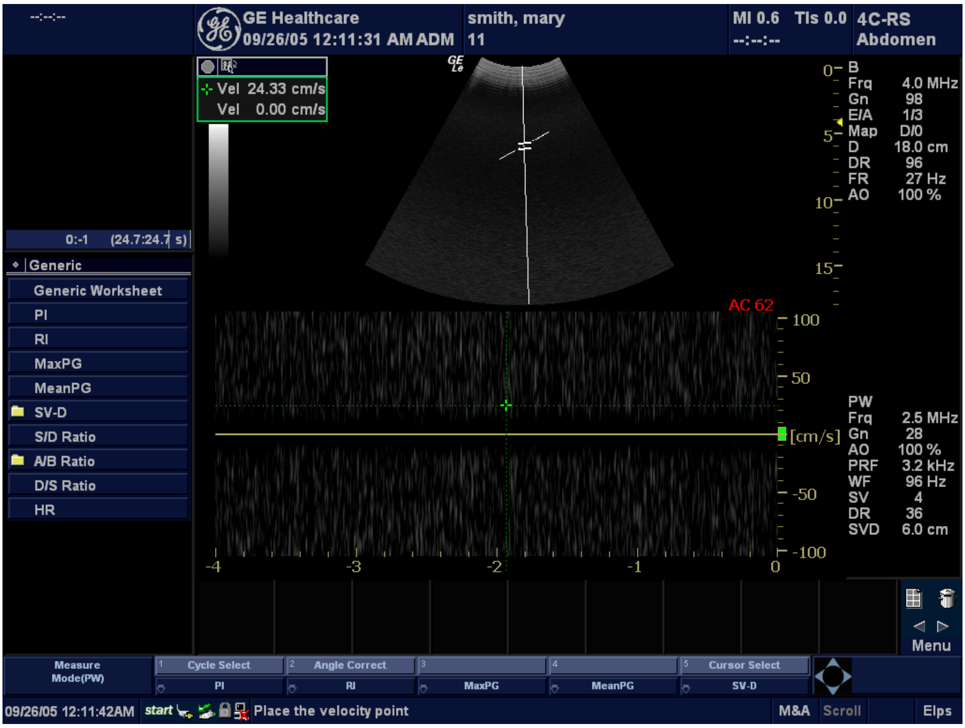
See ‘M-Mode Measurements’ on *page 7-77 for more information.*

Doppler Mode Measurements

Generic Exam Calcs

In Doppler Mode, the Generic Exam Calcs includes the following measurements:

- PI (Pulsatility Index)
- RI (Resistive Index)
- S/D Ratio
- D/S Ratio
- A/B Ratio
- Max PG (Pressure Gradient)
- Mean PG (Pressure Gradient)
- SV (Stroke Volume)
- Heart Rate


GE Healthcare
09/26/05 12:11:31 AM ADM
smith, mary
11
MI 0.6 TIs 0.0
4C-RS
Abdomen

Vel 24.33 cm/s
Vel 0.00 cm/s

B
Frq 4.0 MHz
Gn 98
E/A 1/3
Map D/0
D 18.0 cm
DR 96
FR 27 Hz
AO 100 %

PW
Frq 2.5 MHz
Gn 28
AO 100 %
PRF 3.2 kHz
WF 96 Hz
SV 4
DR 36
SVD 6.0 cm

09/26/05 12:11:42AM
Place the velocity point

--:--:--
0:-1 (24.7:24.7 s)
Generic
Generic Worksheet
PI
RI
MaxPG
MeanPG
SV-D
S/D Ratio
A/B Ratio
D/S Ratio
HR
0
5
10
15
AC 62
100
50
[cm/s]
-50
-100
-4
-3
-2
-1
0
Menu
Measure Mode(PW)
Cycle Select
PI
Angle Correct
RI
MaxPG
MeanPG
Cursor Select
SV-D
start
M&A
Scroll
Elps

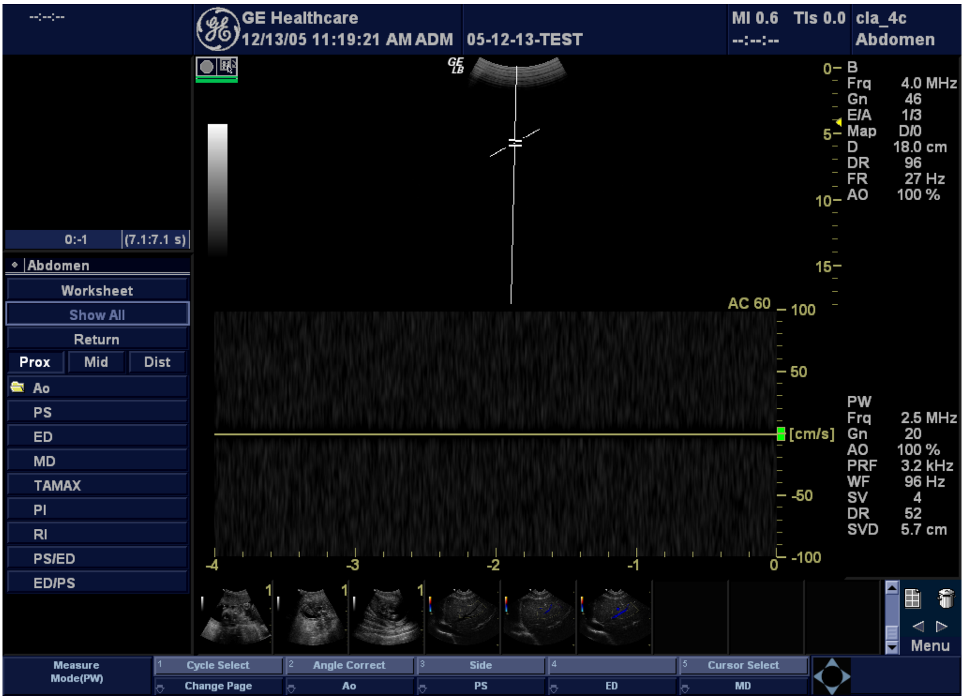
Figure 8-4. Doppler Mode Top/Sub Menu: Abdominal Calculations

See ‘Doppler Mode Measurements’ on *page 7-80 for more information.*

Abdomen and Renal Exam Calcs

Your system is set up to show the measurements that you usually make for each region of interest. To make a measurement that is not shown for the selected region:

1. Select the folder for the region you want to measure.



GE Healthcare
12/13/05 11:19:21 AM ADM 05-12-13-TEST
MI 0.6 TIs 0.0 cla_4c
Abdomen

B
Frq 4.0 MHz
Gn 46
E/A 1/3
Map D/0
D 18.0 cm
DR 96
FR 27 Hz
AO 100 %

PW
Frq 2.5 MHz
Gn 20
AO 100 %
PRF 3.2 kHz
WF 96 Hz
SV 4
DR 52
SVD 5.7 cm

AC 60

--:--:--
0:-1
(7.1:7.1 s)
Abdomen
Worksheet
Show All
Return
Prox
Mid
Dist
Ao
PS
ED
MD
TAMAX
PI
RI
PS/ED
ED/PS
0
5
10
15
100
50
[cm/s]
-50
-100
-4
-3
-2
-1
0
Menu
Measure Mode(PW)
Cycle Select
Change Page
Angle Correct
Ao
Side
PS
ED
Cursor Select
MD

Figure 8-5. Renal Exam Calcs (Doppler Mode)

2. Press Show All.

   The system displays all possible measurements.

3. Select the desired measurement.

NOTE: *The following instructions assume that you first scan the patient and then press **Freeze**.*

Abdomen and Renal Exam Calcs (continued)

Acceleration

1. Select ***Accel***.

   The system displays an active caliper with vertical and horizontal dotted lines.
2. To position the caliper at peak systole, move the **Trackball**.
3. To fix the measure point, press **Set**.

   The system displays a second active caliper.
4. To position the second caliper at end diastole, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the peak systole, end diastole, acceleration time, and acceleration in the Results Window.

Acceleration Time (AT)

1. Select ***AT***.

   The system displays an active caliper and a vertical dotted line.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the acceleration time in the Results Window.

Heart Rate (HR)

See ‘Heart Rate’ on *page 7-79 for more information.*

Abdomen and Renal Exam Calcs (continued)

Peak Systole (PS), End Diastole (ED), or Minimum Diastole (MD)

To calculate the peak systole, end diastole, or minimum diastole:

1. Select ***PS***, ***ED***, or ***MD***.

   The system displays an active caliper with vertical and horizontal dotted lines.
2. To position the caliper at the measurement point, move the **Trackball**.
3. To complete the measurement, press **Set**.

   The system displays the peak systole, end diastole, or minimum diastole in the Results Window.

Pulsatility Index (PI)

See 'Pulsatility Index (PI)' on *page 7-82 for more information.*

PS/ED or ED/PS Ratio

To calculate the Peak Systole/End Diastole ratio or End Diastole/Peak Systole ratio:

1. Select ***PS/ED*** or ***ED/PS***.

   The system displays an active caliper with vertical and horizontal dotted lines.
2. To position the caliper at peak systole (PS) or end diastole (ED), move the **Trackball**.
3. To fix the measure point, press **Set**.

   The system displays a second active caliper.
4. To position the second caliper at end diastole (ED) or peak systole (PS), move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the peak systole, end diastole, and PS/ED or ED/PS ratio in the Results Window.

Resistive Index (RI)

See 'Resistive Index (RI)' on *page 7-83 for more information.*

TAMAX

See 'TAMAX and TAMEAN' on *page 7-56 for more information.*

Small Parts

B-Mode Measurements

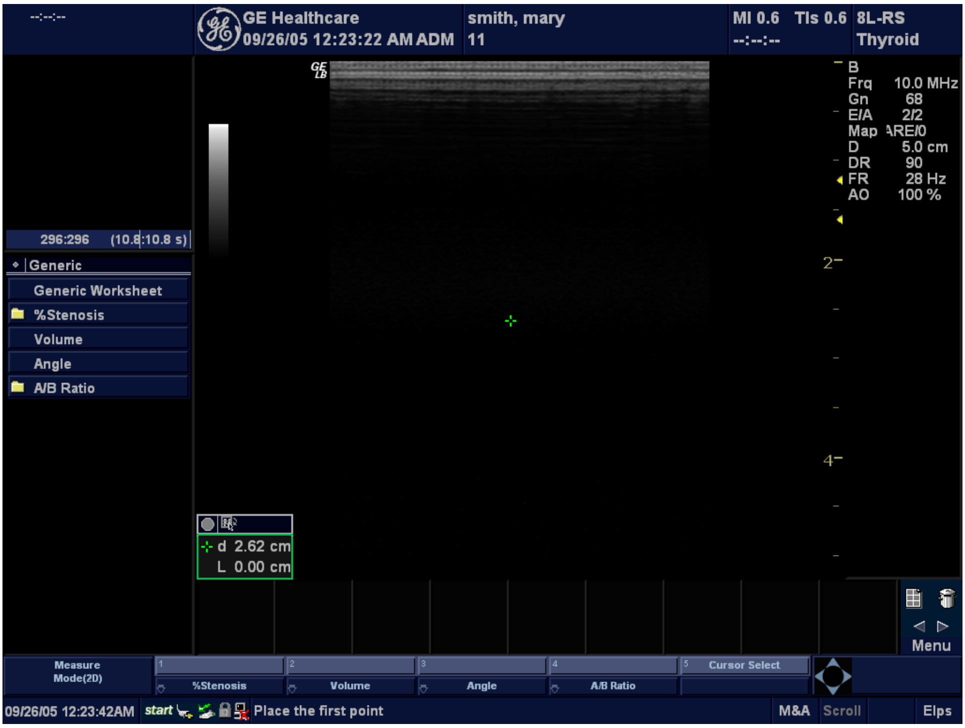
The Small Parts exam category includes the following two folders:

- Generic, measurements listed on the following page
- Small Parts, which includes the thyroid measurements described in this section

Generic Measurements

In B-Mode, the Generic Exam Calcs for Small Parts includes the following measurements:

- % Stenosis
- Volume
- Angle
- A/B Ratio



GE Healthcare 09/26/05 12:23:22 AM ADM

smith, mary 11

MI 0.6 TIs 0.6 8L-RS Thyroid

B
Frq 10.0 MHz
Gn 68
E/A 2/2
Map ARE/0
D 5.0 cm
DR 90
FR 28 Hz
AO 100 %

d 2.62 cm
L 0.00 cm

09/26/05 12:23:42AM

Place the first point

--:--:--
296:296 (10.8:10.8 s)
Generic
Generic Worksheet
%Stenosis
Volume
Angle
A/B Ratio
2
4
Menu
Measure Mode(2D)
1 %Stenosis
2 Volume
3 Angle
4 A/B Ratio
5 Cursor Select
start
M&A
Scroll
Elps

Figure 8-6. Generic Calculations B-Mode Top/Sub Menu

See ‘B-Mode Measurements’ on *page 7-68 for more information.*

Thyroid length, width, and height

Each of these is a standard distance measurement. Length and height are typically measured in the sagittal plane. Width is measured in the transverse/axial plane.

To measure thyroid length, width, or height:

1. On the ***Exam Calcs***, select ***Small Parts***.
2. Select ***Thyroid***.
3. Select the appropriate orientation (side): Right or Left.
4. Select ***Thyroid L***, ***Thyroid W***, or ***Thyroid H***.

   An active caliper displays.
5. Perform a standard distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

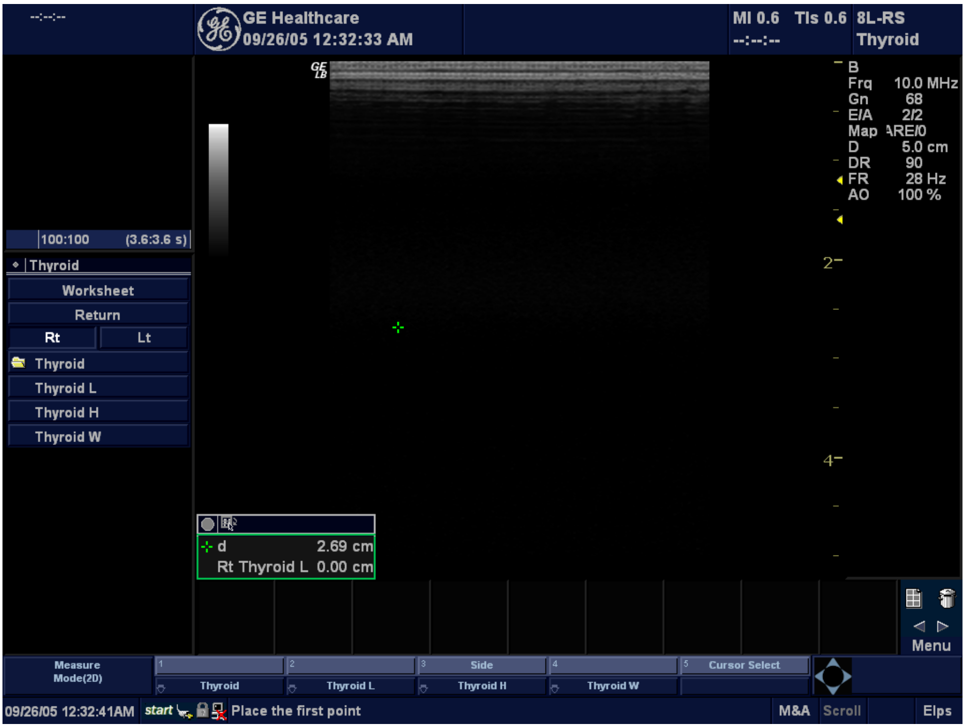
      The system fixes the first caliper and displays a second active caliper, if preset accordingly.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window.
6. To make the second and third distance measurement, repeat steps 2–3.

   After you complete the third distance measurement, the system displays the thyroid volume in the Results Window.

Thyroid length, width, and height (continued)


--:--:--
GE Healthcare
09/26/05 12:32:33 AM
MI 0.6
TIs 0.6
8L-RS
--:--:--
Thyroid
100:100
(3.6:3.6 s)
Thyroid
Worksheet
Return
Rt
Lt
Thyroid
Thyroid L
Thyroid H
Thyroid W
2
4
Menu
Measure Mode(2D)
1
Thyroid
2
Thyroid L
3
Side
Thyroid H
4
Thyroid W
5
Cursor Select
09/26/05 12:32:41AM
start
M&A
Scroll
Elps

B
Frq 10.0 MHz
Gn 68
E/A 2/2
Map ARE/0
D 5.0 cm
DR 90
FR 28 Hz
AO 100 %

d 2.69 cm
Rt Thyroid L 0.00 cm

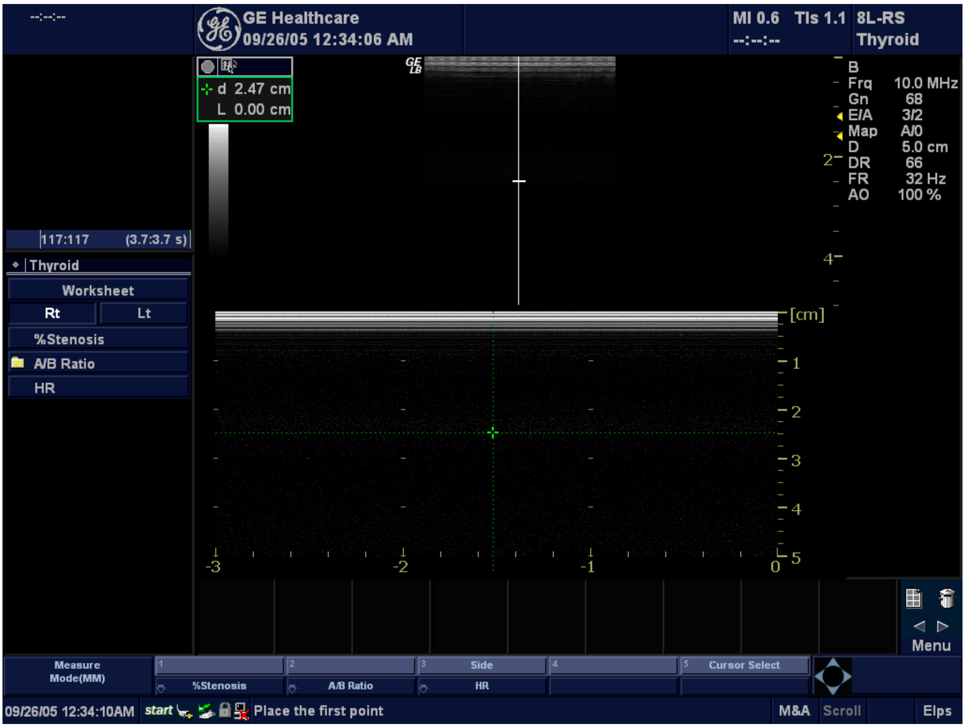
Place the first point

Figure 8-7. B-Mode Thyroid Calculations

M-Mode Measurements

In M-Mode, all Exam Calcs include the following measurements:

- % Stenosis
- A/B Ratio
- Heart Rate



GE Healthcare
09/26/05 12:34:06 AM
MI 0.6 TIs 1.1 8L-RS
Thyroid

d 2.47 cm
L 0.00 cm

B
Frq 10.0 MHz
Gn 68
E/A 3/2
Map A/0
D 5.0 cm
DR 66
FR 32 Hz
AO 100 %

117:117 (3.7:3.7 s)

09/26/05 12:34:10AM
Place the first point

--:--:--
Thyroid
Worksheet
Rt
Lt
%Stenosis
A/B Ratio
HR
[cm]
1
2
3
4
5
-3
-2
-1
0
Menu
Measure Mode(MM)
%Stenosis
A/B Ratio
Side
HR
Cursor Select
start
M&A
Scroll
Elps

Figure 8-8. Thyroid Calculations M-Mode Top/Sub Menu

See ‘M-Mode Measurements’ on *page 7-77 for more information.*

Doppler Mode Measurements

In Doppler Mode, the Exam Calcs include the following measurements:

- PI (Pulsatility Index)
- RI (Resistive Index)
- S/D Ratio
- D/S Ratio
- A/B Ratio
- Max PG (Pressure Gradient)
- Mean PG (Pressure Gradient)
- Heart Rate

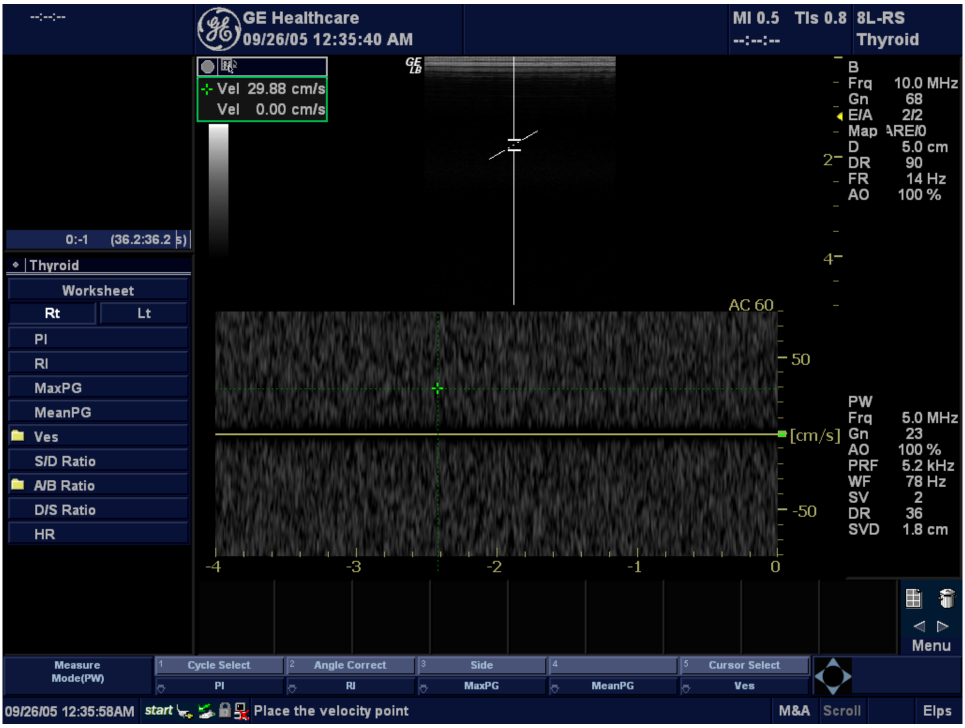

GE Healthcare
09/26/05 12:35:40 AM
MI 0.5 TIs 0.8 8L-RS
Thyroid
Vel 29.88 cm/s
Vel 0.00 cm/s
B
Frq 10.0 MHz
Gn 68
E/A 2/2
Map ARE/0
D 5.0 cm
DR 90
FR 14 Hz
AO 100 %
0:-1 (36.2:36.2 s)
Thyroid
Worksheet
Rt
Lt
PI
RI
MaxPG
MeanPG
Ves
S/D Ratio
A/B Ratio
D/S Ratio
HR
AC 60
50
[cm/s]
-50
-4
-3
-2
-1
0
PW
Frq 5.0 MHz
Gn 23
AO 100 %
PRF 5.2 kHz
WF 78 Hz
SV 2
DR 36
SVD 1.8 cm
Menu
Measure Mode(PW)
Cycle Select
Angle Correct
Side
Cursor Select
PI
RI
MaxPG
MeanPG
Ves
09/26/05 12:35:58AM
start
Place the velocity point
M&A
Scroll
Elps

Figure 8-9. Doppler Mode Top/Sub Menu Thyroid Calculations

Calculation formulas are available in the *Advanced Reference Manual*.

Chapter 9

OB/GYN

Describes how to perform obstetric and gynecology measurements and calculations, and how to use OB graphs and worksheets.

OB Exam

Exam Preparation

Prior to an ultrasound examination, the patient should be informed of the clinical indication, specific benefits, potential risks, and alternatives, if any. In addition, if the patient requests information about the exposure time and intensity, it should be provided. Patient access to educational materials regarding ultrasound is strongly encouraged to supplement the information communicated directly to the patient. Furthermore, these examinations should be conducted in a manner and take place in a setting which assures patient dignity and privacy.

- Prior material knowledge and approval of the presence of nonessential personnel with the number of such personnel kept to a minimum.
- An intent to share with the parents per the physician’s judgement, either during the examination or shortly thereafter, the information derived.
- An offer of choice about viewing the fetus.
- An offer of choice about learning the sex of the fetus, if such information becomes available.

Ultrasound examinations performed solely to satisfy the family's desire to know the fetal sex, to view the fetus, or to obtain a picture of the fetus should be discouraged.

Acoustic Output Considerations

General warning

The LOGIQ e system is a multi-use device which is capable of exceeding FDA Pre-enactment acoustic output (spatial peak-temporal average) intensity limits for fetal applications.

⚠ CAUTION

It is prudent to conduct an exam with the minimum amount and duration of acoustic output necessary to optimize the image's diagnostic value.

Concerns surrounding fetal exposure

Always be aware of the acoustic output level by observing the Acoustic Output Display. In addition, become thoroughly familiar with the Acoustic Output Display and equipment controls affecting output.

Training

It is recommended that all users receive proper training in fetal Doppler applications before performing them in a clinical setting. Please contact a local sales representative for training assistance.

To Start an Obstetrics Exam

NOTE: Calculation formulas are listed in the Advanced Reference Manual.

To begin an Obstetrics exam, you enter patient data or, if the patient data from a previous exam is saved in the system, find the patient information.

1. On the control panel, press ***Patient***.

   The Patient Data Entry screen is displayed.
2. On the Patient Data Entry screen, select New Patient.
3. To choose an Obstetrics exam, move the ***Trackball*** to highlight Obstetrics, then press ***Set***.

   The obstetric fields are listed in the Exam Information section of the Patient Data Entry screen.
4. Do one of the following:

   - If the patient data is already stored in the system, search for the data. Use the search fields in the bottom section of the Patient Data Entry screen. For information about how to search for patient data, See 'Changing Patient Information or an Exam' on *page 4-25 for more information.*

     When the correct patient data is listed in the search list, move the ***Trackball*** to highlight the patient name and press ***Set***. The system displays the patient data.

*NOTE: To change patient data, use the **Trackball** to move the cursor to the field and press **Set**. Press **Backspace** to delete the data, and then type the correct data.*

   - If the patient data is not stored in the system, enter the data. To enter data in a field, move the ***Trackball*** to highlight the field and then press ***Set***. Use the ***Tab*** key to move between fields. Obstetric patient fields are listed in Table 9-1.

NOTE: For information about entering general patient data such as Patient ID and name, See 'Beginning a New Patient' on page 4-3 for more information.

To Start an Obstetrics Exam (continued)

Table 9-1: Obstetric fields

Field	Description
LMP	Last Menstrual Period; enter the date that the patient started her last menstrual period, in mm/dd/yyyy format. You must enter 4 digits for the year. When you type the month and day, the system fills in the /.
BBT	Basal Body Temperature.
EDD by LMP	Estimated Delivery Date by LMP; the system fills in the date after you enter the LMP.
GA by LMP	Gestational Age by LMP; the system fills in the age after you enter the LMP.
Gravida	Number of pregnancies.
Para	Number of births.
AB	Number of abortions.
Ectopic	Number of ectopic pregnancies.
Fetus #	Number of fetuses; default is 1. Can be 1-4.
Accession #	Exam number used with hospital information system (DICOM). This is a tracking number from the worklist.
Exam Description	Describe the type of exam.
Perf Physician	The physician who performs the exam. Choose from the list or type the name.
Ref. Physician	The physician who requested the exam. Choose from the list or type the name.
Operator	The person (not a physician) who performs the scan. Choose from the list.

NOTE: To fill in the following information, move the ***Trackball*** *to highlight the Detail button and press* ***Set****.*

Table 9-2: Obstetric fields: Detail

Field	Description
Indications	Why the patient needs the ultrasound exam.
Comments	Comments about the exam.

To Start an Obstetrics Exam (continued)

After you complete the patient information, you can begin the scan.

1. To change from the Patient Data Entry screen to the Scan screen, do one of the following:
   - On the keyboard, press ***Esc***.
   - On the Control Panel, select **Patient** or **Freeze**.
   - On the Control Panel, press the **B-Mode** key.

   The system displays the Scan screen.
2. To choose the appropriate probe, select the probe icon on the Top/Sub Menu.
3. On the Control Panel, press ***Measure***.

   The default Obstetrics study is displayed on the Top/Sub Menu.

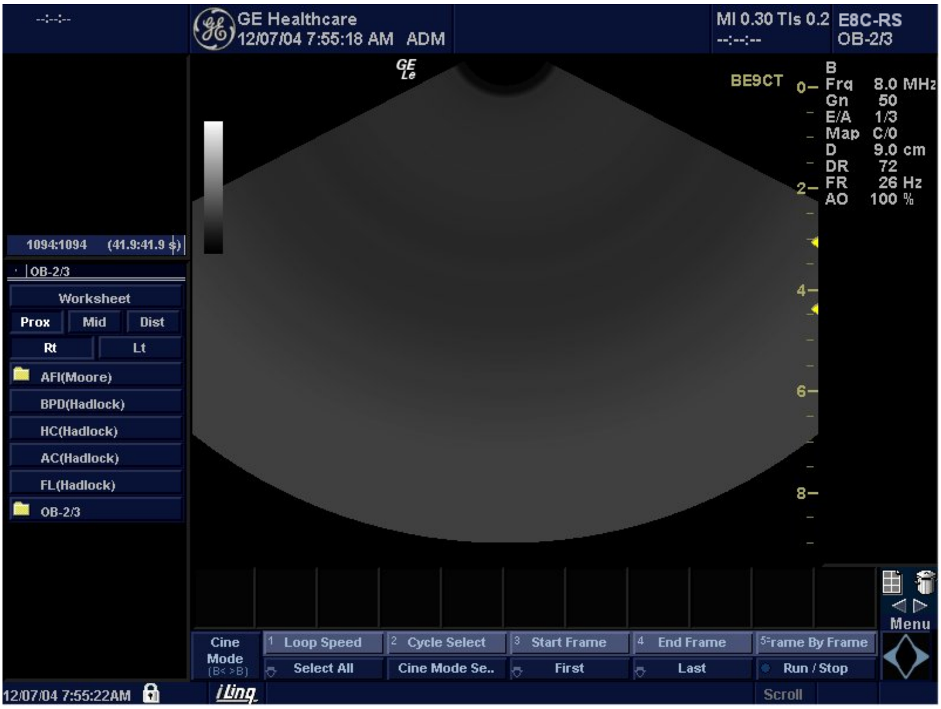

--:--:--
GE Healthcare
12/07/04 7:55:18 AM ADM
MI 0.30 TIs 0.2
--:--:--
E8C-RS
OB-2/3
BE9CT
B
Frq 8.0 MHz
Gn 50
E/A 1/3
Map C/0
D 9.0 cm
DR 72
FR 26 Hz
AO 100 %
0
2
4
6
8
1094:1094 (41.9:41.9 s)
OB-2/3
Worksheet
Prox
Mid
Dist
Rt
Lt
AFI(Moore)
BPD(Hadlock)
HC(Hadlock)
AC(Hadlock)
FL(Hadlock)
OB-2/3
Menu
Cine Mode (B<>B)
1 Loop Speed
2 Cycle Select
3 Start Frame
4 End Frame
5 Frame By Frame
Select All
Cine Mode Se..
First
Last
Run / Stop
12/07/04 7:55:22AM
iLinq
Scroll

Figure 9-1. OB-General Study

To choose a study

1. To change the study on the exam category, select ***Preset***.

   The Obstetrics exam category allows you to choose from the following studies:

   - Generic
   - OB-1
   - OB-2/3
   - OB-General
   - Fetal Heart
   - OB/GYN Vessel

2. To select a study, select the appropriate study on the Top/Sub Menu.

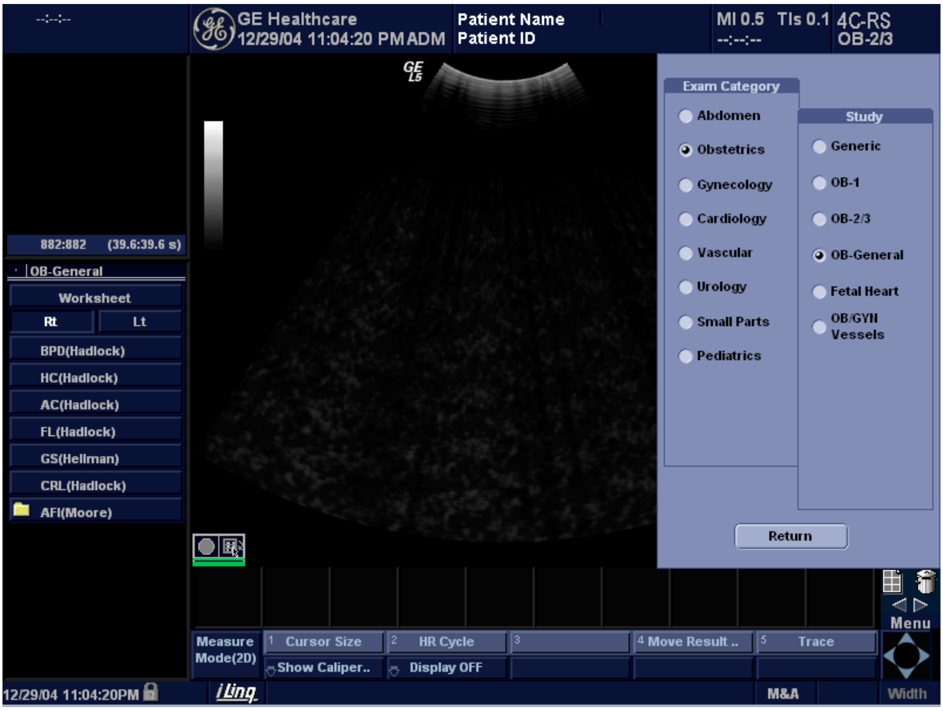

--:--:--
GE Healthcare
12/29/04 11:04:20 PM ADM
Patient Name
Patient ID
MI 0.5 TIs 0.1
--:--:--
4C-RS
OB-2/3
882:882 (39.6:39.6 s)
OB-General
Worksheet
Rt
Lt
BPD(Hadlock)
HC(Hadlock)
AC(Hadlock)
FL(Hadlock)
GS(Hellman)
CRL(Hadlock)
AFI(Moore)
Exam Category
○ Abdomen
● Obstetrics
○ Gynecology
○ Cardiology
○ Vascular
○ Urology
○ Small Parts
○ Pediatrics
Study
○ Generic
○ OB-1
○ OB-2/3
● OB-General
○ Fetal Heart
○ OB/GYN Vessels
Return
Menu
Measure Mode(2D)
1 Cursor Size
Show Caliper..
2 HR Cycle
Display OFF
3
4 Move Result ..
5 Trace
12/29/04 11:04:20PM
iLinq
M&A
Width

Figure 9-2. OB Study Top/Sub Menu

NOTE: The folders you see on the Top/Sub Menu may be different if your system has been customized.

OB Measurements and Calculations

Introduction

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements is not only determined by the system accuracy, but also by use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigators are so noted. Be sure to refer to the original article describing the investigator's recommended clinical procedures.

Introduction (continued)

When you make measurements, you can select the calculation before you make the measurement or after you make it. If you select the calculation before you make the measurement, the Results Window shows the estimated fetal age as you make the measurement. If you select the calculation after you make the measurement, the estimated fetal age is displayed after you complete the measurement. The measurements steps in this section tell you to select the calculation before you make the measurement.

The following pages describe how to make OB measurements and calculations. The measurements are organized by mode, and within mode are listed in alphabetical order.

Out of Range – If the system indicates that a measurement is out of range (OOR), it means one of the following:

- The measurement is out of the normal range based on the gestational age that is calculated from the LMP. The system determines OOR from the ultrasound age compared to the gestational age. The gestational age is calculated from the last menstrual period or the estimated delivery date.
- The measurement is outside of the range for the data used in the calculation. That means that the measurement is either less than or more than the range of measurements used to determine fetal age based on the measurement.

NOTE: *Calculation formulas are listed in the Advanced Reference Manual.*

B-Mode Measurements

This section describes all B-Mode measurements that you typically find in OB studies. Additional OB measurements follow the typical ones.

Abdominal Circumference (AC)

USA ● Europe ● Tokyo ● Osaka ○ ASUM ●

To calculate abdominal circumference, you make an ellipse, trace, spline trace or two distance measurements.

Ellipse

1. Select ***AC***; an active caliper displays.
2. If necessary, select ***AC*** until *Ellipse* is displayed.
3. To position the active caliper, move the **Trackball**.
4. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
5. To position the second caliper, move the **Trackball**.
6. Adjust the **Ellipse** control; an ellipse with an initial circle shape displays.
   - To position the ellipse and to size the measured axes (move the calipers), move the **Trackball**.
   - To increase the size, adjust the **Ellipse** control in a clockwise direction.
   - To decrease the size, adjust the **Ellipse** control in a counterclockwise direction.
   - To toggle between active calipers, press **Measure**.
7. To complete the measurement, press **Set**.

   The system displays the circumference in the Results Window.

HINTS

Before you complete the ellipse measurement:

- To erase the ellipse and the current data measured, press **Clear** once. The original caliper is displayed to restart the measurement.
- To exit the measurement function without completing the measurement, press **Clear** a second time.

Abdominal Circumference (AC) (continued)

Trace

1. Select ***AC***; an active caliper displays.
2. If necessary, select ***AC*** until *Trace* is displayed.
3. To position the trace caliper, move the **Trackball**.
4. To fix the trace start point, press **Set**.

   The trace caliper changes to an active caliper.
5. To trace the measurement area, move the **Trackball** around the anatomy.
6. To complete the measurement, press **Set**.

   The system displays the circumference in the Results Window.

HINTS

Before you complete the ellipse measurement:

- To erase the line (bit by bit) back from its current point, move the **Trackball** or adjust the **Ellipse** control counterclockwise.
- To erase the line (bit by bit) back from its current point, move the **Trackball** or adjust the **Ellipse** control downward.
- To erase the dotted line but not the trace caliper, press **Clear** once.
- To clear the trace caliper and the current data measured, press **Clear** twice.

Abdominal Circumference (AC) (continued)

Spline Trace

1. Select ***AC***; an active caliper displays.
2. If necessary, select *Spline*.
3. To position the trace caliper, move the **Trackball**.
4. To fix the trace start point, press **Set**. The second caliper appears at the same position.
5. To position the second caliper, move the **Trackball** and press **Set**. The third caliper appears at the same position.
6. To position the third caliper, move the **Trackball** and press **Set**.

NOTE: *The spline trace requires at least 3 points to draw a trace. Continue setting the points of the trace until the desired points are set (by moving the Trackball to the appropriate position and pressing Set).*

7. To finalize the spline trace, press **Set** twice at the last caliper position.

   The system displays the circumference in the Results Window.

Abdominal Circumference (AC) (continued)

Two distances

1. Select ***AC***; an active caliper displays.
2. If necessary, select ***AC*** until *Caliper* is displayed.
3. To make the first distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points, if preset accordingly.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window. After the first measurement, the system displays an active caliper.
4. To make the second distance measurement, repeat steps a–d above.

   The system displays the abdominal circumference in the Results Window.

HINTS

- Before you complete a measurement (press **Set**):
  - To toggle between active calipers, press **Measure**.
  - To erase the second caliper and the current data measured and start the measurement again, press **Clear** once.
- To rotate through and activate fixed calipers from other measurements, adjust **Cursor Select**.
- After you complete the measurement, to erase all data that has been measured to this point, but not data entered onto worksheets, press **Clear**.

Biparietal Diameter

USA	Europe	Tokyo	Osaka	ASUM
●	●	●	●	●

To measure biparietal diameter, make one distance measurement:

1. Select ***BPD***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the biparietal diameter in the Results Window.

Crown Rump Length

USA	Europe	Tokyo	Osaka	ASUM
●	●	●	●	●

To measure crown rump length, make one distance measurement:

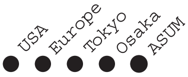
1. Select ***CRL***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the crown rump length in the Results Window.

Femur Length



To measure femur length, make one distance measurement:

1. Select ***FL***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the femur length in the Results Window.

Gestational Sac

● USA ● Europe ● Tokyo ● Osaka ○ ASUM

To calculate the gestational sac, you make three distance measurements in two scan planes. To display two scan planes, press the **L** or **R** key. Get an image in each scan plane and press **Freeze**.

1. Select ***GS***; an active caliper displays.
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window and displays an active caliper.
2. To make the second and third distance measurement, repeat steps a–d.

   After you complete the third distance measurement, the system displays the gestational sac measurement in the Results Window.

Head Circumference (HC)

USA	Europe	Tokyo	Osaka	ASUM
●	●	○	○	●

To calculate head circumference, you make an ellipse, trace, spline trace or two distance measurements.

Ellipse

1. Select ***HC***; an active caliper displays.
2. If necessary, select ***HC*** until *Ellipse* is displayed.
3. To position the active caliper, move the **Trackball**.
4. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
5. To position the second caliper, move the **Trackball**.
6. Adjust the **Ellipse** control; an ellipse with an initial circle shape displays.
   - To position the ellipse and to size the measured axes (move the calipers), move the **Trackball**.
   - To increase the size, adjust the **Ellipse** control in a clockwise direction.
   - To decrease the size, adjust the **Ellipse** control in a counterclockwise direction.
   - To toggle between active calipers, press **Measure**.
7. To complete the measurement, press **Set**.

   The system displays the circumference in the Results Window.

HINTS

Before you complete the ellipse measurement:

- To erase the ellipse and the current data measured, press **Clear** once. The original caliper is displayed to restart the measurement.
- To exit the measurement function without completing the measurement, press **Clear** a second time.

Head Circumference (HC) (continued)

Trace

1. Select ***HC***; an active caliper displays.
2. If necessary, select ***HC*** until *Trace* is displayed.
3. To position the trace caliper, move the **Trackball**.
4. To fix the trace start point, press **Set**.

   The trace caliper changes to an active caliper.
5. To trace the measurement area, move the **Trackball** around the anatomy.
6. To complete the measurement, press **Set**.

   The system displays the circumference in the Results Window.

HINTS

Before you complete the ellipse measurement:

- To erase the line (bit by bit) back from its current point, move the **Trackball** or adjust the **Ellipse** control counterclockwise.
- To erase the line (bit by bit) back from its current point, move the **Trackball** or adjust the **Ellipse** control downward.
- To erase the dotted line but not the trace caliper, press **Clear** once.
- To clear the trace caliper and the current data measured, press **Clear** twice.

Head Circumference (HC) (continued)

Spline Trace

1. Select ***HC***; an active caliper displays.
2. If necessary, select *Spline*.
3. To position the trace caliper, move the **Trackball**.
4. To fix the trace start point, press **Set**. The second caliper appears at the same position.
5. To position the second caliper, move the **Trackball** and press **Set**. The third caliper appears at the same position.
6. To position the third caliper, move the **Trackball** and press **Set**.

NOTE: The spline trace requires at least 3 points to draw a trace. Continue setting the points of the trace until the desired points are set (by moving the Trackball to the appropriate position and pressing Set).

7. To finalize the spline trace, press **Set** twice at the last caliper position.

   The system displays the circumference in the Results Window.

Head Circumference (HC) (continued)

Two distances

1. Select ***HC***; an active caliper displays.
2. If necessary, select ***HC*** until *Caliper* is displayed.
3. To make the first distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points, if preset accordingly.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window. After the first measurement, the system displays an active caliper.
4. To make the second distance measurement, repeat steps a–d above.

   The system displays the abdominal circumference in the Results Window.

HINTS

- Before you complete a measurement (press **Set**):
  - To toggle between active calipers, press **Measure**.
  - To erase the second caliper and the current data measured and start the measurement again, press **Clear** once.
- To rotate through and activate fixed calipers from other measurements, adjust **Cursor Select**.
- After you complete the measurement, to erase all data that has been measured to this point, but not data entered onto worksheets, press **Clear**.

Amniotic Fluid Index (AFI)

USA	Europe	Tokyo	Osaka	ASUM
●	●	●	●	●

To calculate the amniotic fluid index, you make measurements of the four quadrants of the uterine cavity. The system adds these four measurements together to calculate the Amniotic Fluid Index.

NOTE: The four quadrants can be measured with distance (caliper) or circumference (circle) measurements. Press the appropriate AFI quadrant Top/Sub Menu key to toggle between caliper and circle.

1. Select ***AFI***.

   The first distance measurement, AFI-Q1, is already selected.
2. Make a standard distance measurement for the first quadrant:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window.
3. When the measurement of the first quadrant is completed, unfreeze and move to the second quadrant.
4. After you obtain the image, press **Freeze** and then **Measure**.

   The system prompts you to continue with the AFI measurements. Make sure that the next quadrant has been selected.

Amniotic Fluid Index (AFI) (continued)

5. Perform a standard distance measurement for the second, third, and fourth quadrants (see step 2).

   When all four quadrants have been measured, the system calculates the AFI total and displays it in the Results Window.

HINTS

- If you unfreeze the image after doing an AFI measurement, the system does not delete the previous measurements. Unfreeze and change scan planes as necessary.
- To specify that an unassigned distance measurement be used for an AFI measurement:
  - Select ***AFI***.
  - Press **Measure**.
  - Move the **Trackball** to highlight the unassigned distance measurement in the Results Window.
  - Select the AFI measurement on the Top/Sub Menu.
- If the fluid in a pocket is zero, set the second caliper on top of the first one to give it a zero value.
- You can measure an AFI quadrant that is zero (0) by pressing **Set** twice.

A/B Ratio

In B-Mode you can calculate A/B ratio by diameter or by area. See ‘A/B Ratio’ on *page 7-76 for more information.*

Angle

See ‘Angle’ on *page 7-75 for more information.*

Antero-Postero Trunk Diameter & Transverse Trunk Diameter (APTD-TTD)

USA ○ Europe ○ Tokyo ● Osaka ○ ASUM ○

Make two distance measurements, one of the antero-postero trunk diameter and one of the transverse trunk diameter.

1. Select ***APTD_TTD***; an active caliper displays.
2. Make a distance measurement of the antero-postero trunk diameter:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window and displays an active caliper.
3. To make a distance measurement of the transverse trunk diameter, repeat steps a–d above.

   The system displays the antero-postero trunk diameter and the transverse trunk diameter in the Results Window.

Antero-PosteroTrunk Diameter by Transverse Trunk Diameter (AxT)

○ USA ○ Europe ● Tokyo ○ Osaka ○ ASUM

Make two distance measurements, one of the antero-postero trunk diameter and one of the transverse trunk diameter.

1. Select ***AxT***; an active caliper displays.
2. Make a distance measurement of the antero-postero trunk diameter:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window and displays an active caliper.
3. To make a distance measurement of the transverse trunk diameter, repeat steps a–d above.

   The system displays the antero-postero trunk diameter, the transverse trunk diameter, and AxT in the Results Window.

Cardio-Thoracic Area Ratio (CTAR)

USA	Europe	Tokyo	Osaka	ASUM
○	○	○	●	○

To calculate cardio-thoracic area ratio, you make two ellipse measurements.

1. Select ***CTAR***; an active caliper displays.
2. Make an ellipse measurement of the cardiac area:
    a. To position the active caliper, move the **Trackball**.
    b. To fix the start point, press **Set**.

       The system fixes the first caliper and displays a second active caliper.
    c. To position the second caliper, move the **Trackball**.
    d. Adjust the **Ellipse** control; an ellipse with an initial circle shape displays.
    - To position the ellipse and to size the measured axes (move the calipers), move the **Trackball**.
    - To increase the size, adjust the **Ellipse** control in a clockwise direction.
    - To decrease the size, adjust the **Ellipse** control in a counterclockwise direction.
    - To toggle between active calipers, press **Measure**.

    e. To complete the ellipse measurement, press **Set**.

       The system displays the cardiac area measurement in the Results Window
3. To make an ellipse measurement of the thoracic area, repeat steps a–e.

   The system displays the cardio-thoracic area ratio in the Results Window.

Estimated Fetal Weight (EFW)

● USA ● Europe ● Tokyo ● Osaka ● ASUM

To measure estimated fetal weight, you make several OB measurements. These measurements can vary, based on how your system is set up. Measurements can include biparietal diameter, fetal trunk area, femur length, antero-postero trunk diameter and transverse trunk diameter, abdominal circumference, head circumference and spinal length.

1. Select ***EFW***.

   The system displays the required measurements.
2. Make each measurement.

   The system displays each measurement and the estimated fetal weight in the Results Window.

NOTE: For a description of any of the required measurements, refer to that measurement.

Fetal Trunk Area (FTA)

USA ○ Europe ○ Tokyo ○ Osaka ● ASUM ○

To measure fetal trunk area, you make an ellipse, trace, spline trace or two distance measurements.

Ellipse

1. Select ***FTA***; an active caliper displays.
2. To position the active caliper, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper, move the **Trackball**.
5. Adjust the **Ellipse** control; an ellipse with an initial circle shape displays.
   - To position the ellipse and to size the measured axes (move the calipers), move the **Trackball**.
   - To increase the size, adjust the **Ellipse** control in a clockwise direction.
   - To decrease the size, adjust the **Ellipse** control in a counterclockwise direction.
   - To toggle between active calipers, press **Measure**.
6. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

HINTS

Before you complete the ellipse measurement:

- To erase the ellipse and the current data measured, press **Clear** once. The original caliper is displayed to restart the measurement.
- To exit the measurement function without completing the measurement, press **Clear** a second time.

Fetal Trunk Area (FTA) (continued)

Trace

1. Select ***FTA***; a trace caliper displays.
2. To position the trace caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The trace caliper changes to an active caliper.
4. To trace the measurement area, move the **Trackball** around the anatomy.

   A dotted line shows the traced area.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

HINTS

Before you complete the trace measurement:

- To erase the line (bit by bit) back from its current point, move the **Trackball** or adjust the **Ellipse** control counterclockwise.
- To erase the line (bit by bit) back from its current point, move the **Trackball** or adjust the **Ellipse** control downward.
- To erase the dotted line but not the trace caliper, press **Clear** once.
- To clear the trace caliper and the current data measured, press **Clear** twice.

Fetal Trunk Area (FTA) (continued)

Spline Trace

1. Select ***FTA***; an active caliper displays.
2. If necessary, select *Spline*.
3. To position the trace caliper, move the **Trackball**.
4. To fix the trace start point, press **Set**. The second caliper appears at the same position.
5. To position the second caliper, move the **Trackball** and press **Set**. The third caliper appears at the same position.
6. To position the third caliper, move the **Trackball** and press **Set**.

NOTE: *The spline trace requires at least 3 points to draw a trace. Continue setting the points of the trace until the desired points are set (by moving the Trackball to the appropriate position and pressing Set).*

7. To finalize the spline trace, press **Set** twice at the last caliper position.

   The system displays the circumference in the Results Window.

Fetal Trunk Area (FTA) (continued)

Two distances

1. Select ***FTA***; an active caliper displays.
2. Make the first distance measurement:
   1. To position the active caliper at the start point, move the **Trackball**.
   2. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   3. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points, if preset accordingly.
   4. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window and displays an active caliper.
3. To make the second distance measurement, repeat steps a–d above.

   The system displays the measurement in the Results Window.

HINTS

- Before you complete a measurement:
  - To toggle between active calipers, press **Measure**.
  - To erase the second caliper and the current data measured and start the measurement again, press **Clear** once.
- To rotate through and activate previously fixed calipers, adjust **Cursor Select**.
- After you complete the measurement, to erase all data that has been measured to this point, but not data entered onto worksheets, press **Clear**.

Foot Length

○ USA ● Europe ○ Tokyo ○ Osaka ○ ASUM

To measure foot length, make one distance measurement:

1. Select ***Ft***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the foot length in the Results Window.

Humerus Length

USA	Europe	Tokyo	Osaka	ASUM
○	●	○	●	●

To measure humerus length, make one distance measurement:

1. Select ***HL***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the humerus length in the Results Window.

Occipitofrontal Diameter

● USA ● Europe ○ Tokyo ○ Osaka ● ASUM

To measure occipitofrontal diameter, make one distance measurement:

1. Select ***OFD***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the occipitofrontal diameter in the Results Window.

% Stenosis

In B-Mode, you can calculate % Stenosis by diameter or by area. See '% Stenosis' on *page 7-69 for more information.*

Spinal Length (SL)

USA	Europe	Tokyo	Osaka	ASUM
○	○	●	○	○

To measure spinal length, make one distance measurement:

1. Select ***SL***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the spinal length in the Results Window.

Transverse Abdominal Diameter

USA	Europe	Tokyo	Osaka	ASUM
○	●	○	○	○

To measure transverse abdominal diameter, make one distance measurement:

1. Select ***TAD***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the transverse abdominal diameter in the Results Window.

Transverse Cerebellar Diameter

USA	Europe	Tokyo	Osaka	ASUM
○	●	○	○	○

To measure transverse cerebellar diameter, make one distance measurement:

1. Select ***TCD***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the transverse cerebellar diameter in the Results Window.

Thorax Transverse Diameter

USA	Europe	Tokyo	Osaka	ASUM
○	●	○	○	○

To measure thorax transverse diameter, make one distance measurement:

1. Select ***ThD***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the thorax transverse diameter in the Results Window.

Tibia Length

USA	Europe	Tokyo	Osaka	ASUM
○	●	○	○	○

To measure tibia length, make one distance measurement:

1. Select ***Tibia***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the tibia length in the Results Window.

Ulna Length

USA	Europe	Tokyo	Osaka	ASUM
○	●	○	○	○

To measure ulna length, make one distance measurement:

1. Select ***Ulna***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the ulna length in the Results Window.

Volume

See ‘Volume’ on *page 7-71 for more information.*

M-Mode Measurements

In M-Mode you can measure % stenosis, A/B ratio, and heart rate.

% Stenosis

In M-Mode, you measure % Stenosis by diameter. See '% Stenosis' on *page 7-69 for more information.*

A/B Ratio

In M-Mode you can measure A/B ratio by diameter, time, or velocity. See 'A/B Ratio' on *page 7-78 for more information.*

Heart Rate

See 'Heart Rate' on *page 7-79 for more information.*

Doppler Mode Measurements

You can use Doppler mode to study fetal blood flow in the heart, umbilical cord, placenta, and middle cerebral arteries. OB/GYN Doppler mode also allows you to study uterine and ovarian blood flow.

The OB/GYN vessel study includes the following vessels:

- Aorta (Ao)
- Desc. Aorta
- Middle Cerebral Artery (MCA) (right and left)
- Ovarian (right and left)
- Placenta
- Umbilical
- Uterine (right and left)

For each of these studies, you can make any of the following measurements:

- Peak Systole (PS)
- End Diastole (ED)
- Minimum Diastole (MD)
- Heart Rate
- TAMAX
- Pulsatility Index (PI)
- Resistive Index (RI)
- PS/ED Ratio
- ED/PS Ratio
- Acceleration
- AT
- TAMEAN
- Volume Flow
- PV

To select OB/GYN vessel measurements

OB/GYN Vessel measurements use the auto sequence feature. With this feature, when you select a folder for the vessel you want to measure, the system automatically starts the first measurement. It then continues with each of the other measurements in that study.

1. Select the folder for the vessel you want to measure.

   The system shows all the measurements for that vessel. The caliper for the first measurement is automatically displayed.
2. Make the measurement.

   After you complete each measurement, the system starts the next measurement. After the last measurement is complete, the system returns to the OB/GYN Vessel Top/ Sub Menu.

Your system is set up to show the measurements that you usually make for each vessel. To make a measurement that is not shown for the selected vessel:

1. Select the folder for the vessel you want to measure.
2. Select Show All.

   The system display all possible vessel measurements.
3. Select the desired measurement.

The following pages describe the steps to make each specific measurement in the OB/GYN Vessel study.

Acceleration

1. Select ***Accel***.

   The system displays an active caliper with vertical and horizontal dotted lines.
2. To position the caliper at the onset of systole, move the **Trackball**.
3. To fix the measure point, press Set.

   The system displays a second active caliper.
4. To position the second caliper at early systolic peak, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the acceleration time and acceleration in the Results Window.

Acceleration Time (AT)

1. Select ***AT***.

   The system displays an active caliper and a vertical dotted line.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the acceleration time in the Results Window.

Heart Rate

This measurement is available in the Fetal Heart study and the OB/GYN Vessel study. See ‘Heart Rate’ on *page 7-79 for more information.*

Peak Systole (PS), End Diastole (ED), or Minimum Diastole (MD)

To calculate the peak systole, end diastole, or minimum diastole:

1. Select ***PS***, ***ED***, or ***MD***.

   The system displays an active caliper with vertical and horizontal dotted lines.
2. To position the caliper at the measurement point, move the **Trackball**.
3. To complete the measurement, press **Set**.

   The system displays the peak systole, end diastole, or minimum diastole in the Results Window.

PS/ED or ED/PS Ratio

To calculate the Peak Systole/End Diastole ratio or End Diastole/Peak Systole ratio:

1. Select ***PS/ED*** or ***ED/PS***.

   The system displays an active caliper with vertical and horizontal dotted lines.
2. To position the caliper at peak systole (PS) or end diastole (ED), move the **Trackball**.
3. To fix the measure point, press **Set**.

   The system displays a second active caliper.
4. To position the second caliper at end diastole (ED) or peak systole (PS), move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the peak systole, end diastole, and PS/ED or ED/PS ratio in the Results Window.

Pulsatility Index (PI)

See 'Pulsatility Index (PI)' on *page 7-82 for more information.*

Resistive Index (RI)

See 'Resistive Index (RI)' on *page 7-83 for more information.*

TAMAX

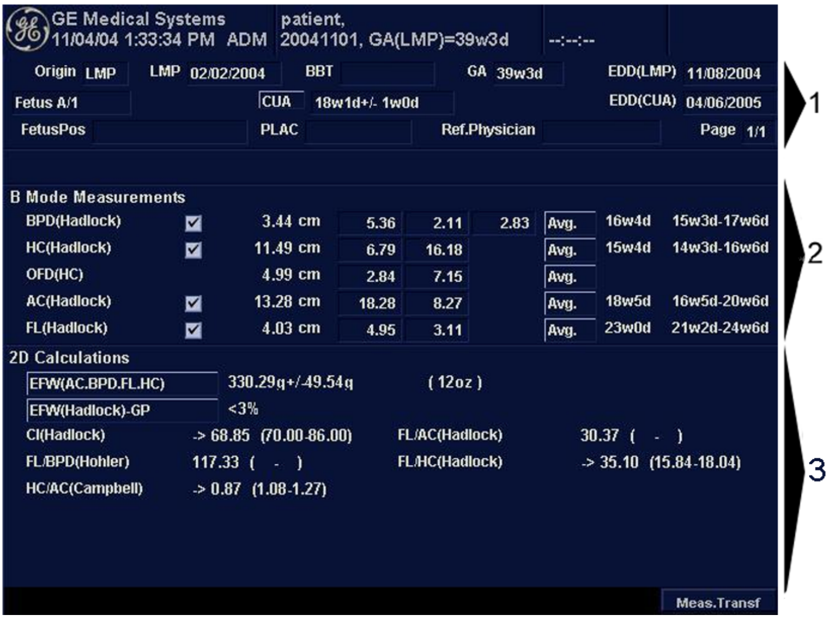
See 'TAMAX and TAMEAN' on *page 7-56 for more information.*

OB Worksheet

The OB Worksheet lists patient information, and all measurement and calculation data.

To view the OB Worksheet:

1. Press **Measure**.
2. Select ***Worksheet Display***.



GE Medical Systems
11/04/04 1:33:34 PM ADM
patient,
20041101, GA(LMP)=39w3d
--:--:--

Origin LMP
LMP 02/02/2004
BBT
GA 39w3d
EDD(LMP) 11/08/2004
Fetus A/1
CUA 18w1d+/- 1w0d
EDD(CUA) 04/06/2005
FetusPos
PLAC
Ref.Physician
Page 1/1

B Mode Measurements

BPD(Hadlock)	☑	3.44 cm	5.36	2.11	2.83	Avg.	16w4d	15w3d-17w6d
HC(Hadlock)	☑	11.49 cm	6.79	16.18		Avg.	15w4d	14w3d-16w6d
OFD(HC)		4.99 cm	2.84	7.15		Avg.		
AC(Hadlock)	☑	13.28 cm	18.28	8.27		Avg.	18w5d	16w5d-20w6d
FL(Hadlock)	☑	4.03 cm	4.95	3.11		Avg.	23w0d	21w2d-24w6d

2D Calculations

EFW(AC.BPD.FL.HC) 330.29g+/-49.54g (12oz)
EFW(Hadlock)-GP <3%
CI(Hadlock) -> 68.85 (70.00-86.00)
FL/AC(Hadlock) 30.37 (-)
FL/BPD(Hohler) 117.33 (-)
FL/HC(Hadlock) -> 35.10 (15.84-18.04)
HC/AC(Campbell) -> 0.87 (1.08-1.27)

Figure 9-3. OB Worksheet

The OB Worksheet has three sections of information:

1. Patient data
2. Measurement information
3. Calculation information

Patient data

The Patient data section, at the top of the worksheet, lists information from the Patient Data Entry screen.

You can select the following fields:

- FetusNo – if this is a multi-gestational patient, you can select the fetus in this field. You can also adjust the **Fetus** selection to change the fetus.
- CUA/AUA – select the ultrasound age calculation method
  - Composite Ultrasound Age (CUA) – regression calculation
  - Average Ultrasound Age (AUA) – an arithmetic average

  You can select the method in this field, or adjust the **Select CUA/AUA** control.

You can enter information in the following fields:

- FetusPos – type information about the fetus position.
- PLAC – type information about the placenta.

Measurement information

This section lists the results of all measurements.

- CUA or AUA – If this field is checked, the system uses the measurement to calculate the ultrasound age.
- Value – The measured value. If more than one measurement was made for an item, the system uses the specified method (average, maximum, minimum, or last) to determine this value.
- m1–m3 – Up to three measurement values for each item. If you make more than three measurements, the worksheet uses the last three.
- Method – When there is more than one measurement for an item, this specifies the method used to calculate the measurement value listed in the Value column. Choices are average, maximum, minimum, or last. To change the method:
    a. Move the **Trackball** to the Method field.
    b. Press **Set**.
    c. Move the **Trackball** to select from the list.
    d. Press **Set**.
- AGE – The fetal age for this measurement.
- Range – The typical range of fetal age for this measurement.

Calculation information

This section of the worksheet provides calculation choices and lists calculation results.

- EFW – lists the parameters used to calculate EFW. This is followed by the calculation result.

  To change which parameters are used:

  a. Select this field or press ***Select EFW***.
  b. Select the desired parameters.

- EFW GP – lists the source used to calculate EFW–GP (growth percentile). This is followed by the growth percentile.

  To change the source:

  a. Select this field or press ***Select GP***.
  b. Select the desired source.

The remaining calculation information shows ratios for several measurements, and the Cephalic Index (CI).

The worksheet shows if any of the ratios are out of range (OOR). Out of range indicates one of the following:

- The measurement is out of the normal range based on the gestational age that is calculated from the LMP. The system determines OOR from the ultrasound age compared to the gestational age. The gestational age is calculated from the last menstrual period or the estimated delivery date.
- The measurement is outside of the range for the data used in the calculation. That means that the measurement is either less than or more than the range of measurements used to determine fetal age based on the measurement.

For more information about how to use the worksheet, See 'Viewing and Editing Worksheets' on *page 7-61 for more information.*

Anatomical Survey

Overview

The Anatomical Survey page provides a checklist that indicates which anatomy was imaged and its appearance.

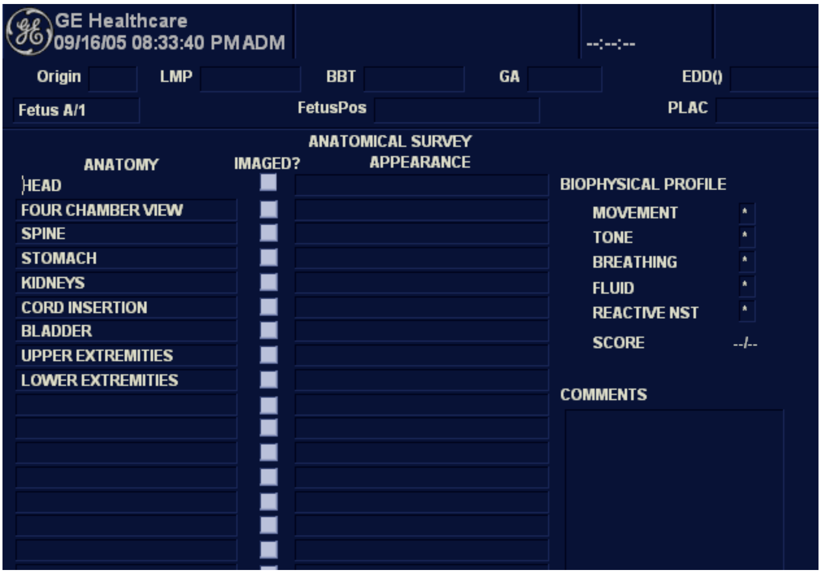
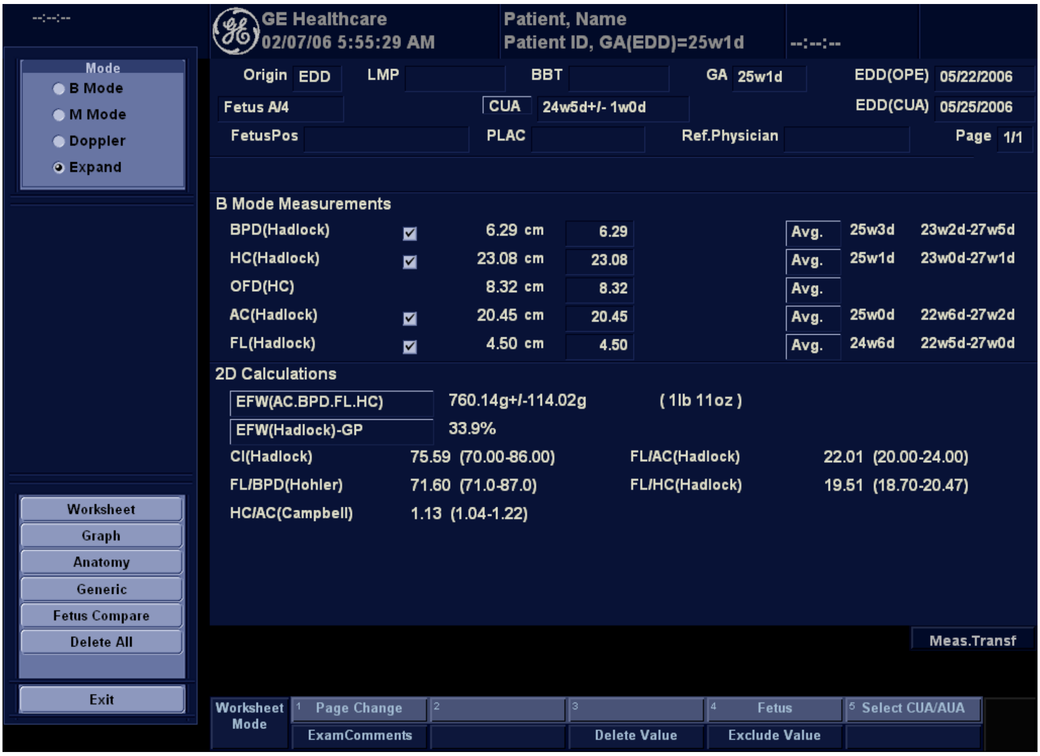

GE Healthcare
09/16/05 08:33:40 PM ADM
--:--:--
Origin
LMP
BBT
GA
EDD()
Fetus A/1
FetusPos
PLAC
ANATOMICAL SURVEY
ANATOMY
IMAGED?
APPEARANCE
HEAD
FOUR CHAMBER VIEW
SPINE
STOMACH
KIDNEYS
CORD INSERTION
BLADDER
UPPER EXTREMITIES
LOWER EXTREMITIES
BIOPHYSICAL PROFILE
MOVEMENT
TONE
BREATHING
FLUID
REACTIVE NST
SCORE
--/--
COMMENTS

Figure 9-4. Anatomical Survey

Editing

- To activate the Anatomical Survey, select ***Anatomy*** on the OB Worksheet Top/Sub Menu.



GE Healthcare
02/07/06 5:55:29 AM
Patient, Name
Patient ID, GA(EDD)=25w1d

Origin EDD | LMP | BBT | GA 25w1d | EDD(OPE) 05/22/2006
Fetus A/4 | CUA 24w5d+/- 1w0d | EDD(CUA) 05/25/2006
FetusPos | PLAC | Ref.Physician | Page 1/1

B Mode Measurements

BPD(Hadlock)	☑	6.29 cm	6.29	Avg.	25w3d	23w2d-27w5d
HC(Hadlock)	☑	23.08 cm	23.08	Avg.	25w1d	23w0d-27w1d
OFD(HC)		8.32 cm	8.32	Avg.		
AC(Hadlock)	☑	20.45 cm	20.45	Avg.	25w0d	22w6d-27w2d
FL(Hadlock)	☑	4.50 cm	4.50	Avg.	24w6d	22w5d-27w0d

2D Calculations

EFW(AC.BPD.FL.HC) 760.14g+/-114.02g (1lb 11oz)
EFW(Hadlock)-GP 33.9%

CI(Hadlock)	75.59 (70.00-86.00)	FL/AC(Hadlock)	22.01 (20.00-24.00)
FL/BPD(Hohler)	71.60 (71.0-87.0)	FL/HC(Hadlock)	19.51 (18.70-20.47)
HC/AC(Campbell)	1.13 (1.04-1.22)		

--:--:--
Mode
○ B Mode
○ M Mode
○ Doppler
● Expand
Worksheet
Graph
Anatomy
Generic
Fetus Compare
Delete All
Exit
Meas.Transf
Worksheet Mode
1 Page Change
ExamComments
2
3
Delete Value
4 Fetus
Exclude Value
5 Select CUA/AUA

Figure 9-5. OB Worksheet Top/Sub Menu

- Fill the required field.

Table 9-3: Anatomical Survey

Field	Description
Fetus Pos	Indicate the fetal position within the uterus.
PLAC	Identify the location of the placenta.
ANATOMY	Enter the following information for each part of the anatomy imaged: 1. Imaged? : Check the box that you did image this part of the anatomy. 2. Appearance : If you checked the Imaged? box, indicate whether the appearance was normal or abnormal.
	You can add the required anatomy up to 9 additional anatomy. Move the Trackball to the blank field.

Table 9-3: Anatomical Survey (Continued)

Field	Description
	Enter the anatomy name.
BIOPHYSICAL	The score is _ of 10 possible total points, depending upon the number of parameters entered. Enter the following information to assess the fetus's biophysical well-being.
Movement	Type 0, 1 or 2
Tone	Type 0, 1 or 2
Breathing	Type 0, 1 or 2
Fluid	Type 0, 1 or 2
Reactive NST (Reactive non-stress test)	Type 0, 1 or 2
COMMENTS	Free text

Select Exit to return to the Scan screen.

Select Worksheet to return to the Worksheet or Graph to enter the OB Graph screen on the Top/Sub Menu.

NOTE: The patient specific contents input on the Anatomical Survey page are returned to the factory default settings after starting a new patient.

OB Graphs

Overview

OB Graphs allow you to assess fetal growth compared to a normal growth curve. When a patient has completed two or more ultrasound exams, you can also use the graphs to look at fetal trending. For multi-gestational patients you can plot all fetuses and compare the growth on the graphs.

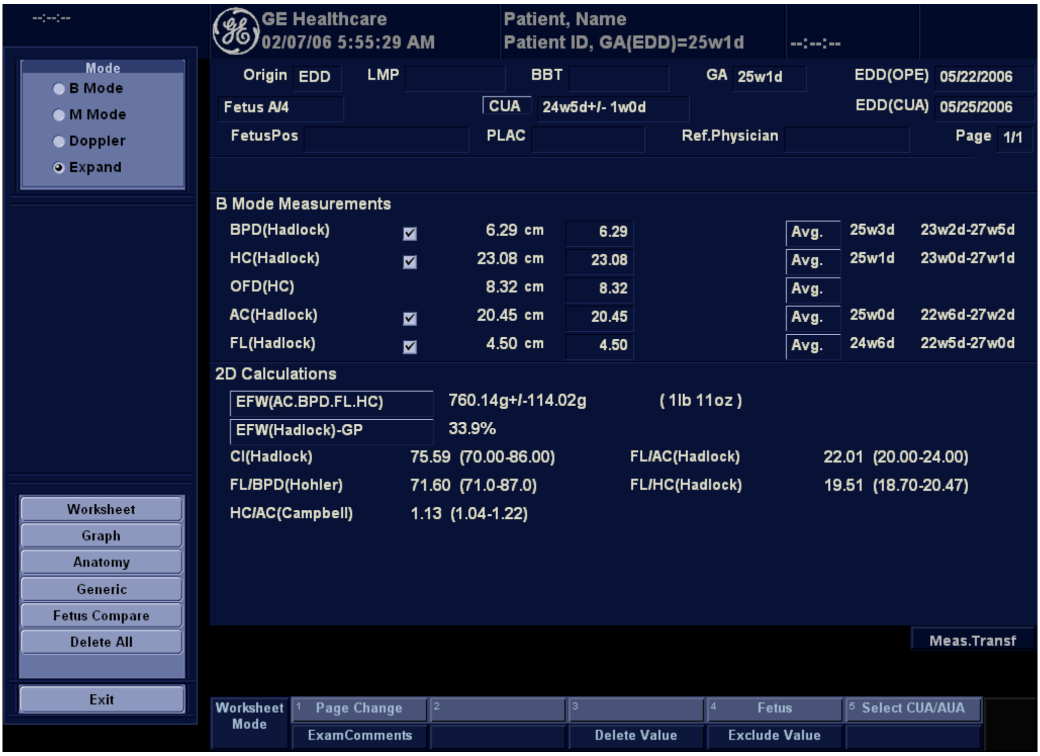
The LOGIQ e provides the following two basic types of graphs:

- **Fetal Growth Curve graphs** – show one measurement per graph. These graphs show the normal growth curve, positive and negative standard deviations or applicable percentiles, and ultrasound age of the fetus using the current measurement. For multi-gestational pregnancies, you can view all fetuses. If previous exam data is available, the graph can show fetal trending.
- **Fetal Growth Bar graph** – shows the ultrasound age and the gestational age based on patient data. Plots all measurements on one graph.

To View OB Graphs

To view OB graphs:

1. Press **Measure**.
2. Select ***Graph***.



--:--:--

GE Healthcare
02/07/06 5:55:29 AM

Patient, Name
Patient ID, GA(EDD)=25w1d

--:--:--

Origin EDD
LMP
BBT
GA 25w1d
EDD(OPE) 05/22/2006
Fetus A/4
CUA 24w5d+/- 1w0d
EDD(CUA) 05/25/2006
FetusPos
PLAC
Ref.Physician
Page 1/1

B Mode Measurements

BPD(Hadlock)	☑	6.29 cm	6.29	Avg.	25w3d	23w2d-27w5d
HC(Hadlock)	☑	23.08 cm	23.08	Avg.	25w1d	23w0d-27w1d
OFD(HC)		8.32 cm	8.32	Avg.		
AC(Hadlock)	☑	20.45 cm	20.45	Avg.	25w0d	22w6d-27w2d
FL(Hadlock)	☑	4.50 cm	4.50	Avg.	24w6d	22w5d-27w0d

2D Calculations

EFW(AC.BPD.FL.HC) 760.14g+/-114.02g (1lb 11oz)
EFW(Hadlock)-GP 33.9%

CI(Hadlock)	75.59 (70.00-86.00)	FL/AC(Hadlock)	22.01 (20.00-24.00)
FL/BPD(Hohler)	71.60 (71.0-87.0)	FL/HC(Hadlock)	19.51 (18.70-20.47)
HC/AC(Campbell)	1.13 (1.04-1.22)		

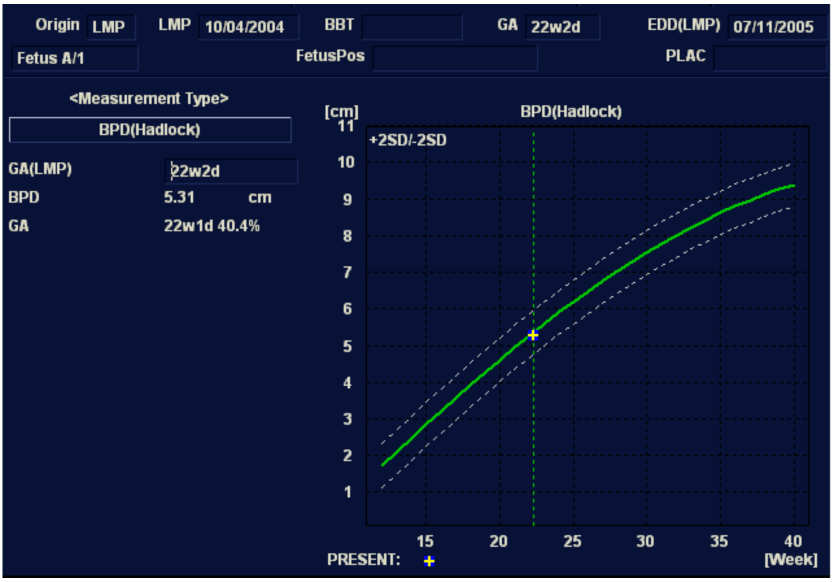
Mode
○ B Mode
○ M Mode
○ Doppler
● Expand
Worksheet
Graph
Anatomy
Generic
Fetus Compare
Delete All
Exit
Meas.Transf
Worksheet Mode
1 Page Change
ExamComments
2
3
Delete Value
4 Fetus
Exclude Value
5 Select CUA/AUA

Figure 9-6. B-Mode OB Measurement Top/Sub Menu

To View OB Graphs (continued)

After you select ***Graph Display***, the system displays the OB Graph keys on the Top/Sub Menu.

The monitor display shows the Fetal Growth Curve Graph.



Origin LMP
LMP 10/04/2004
BBT
GA 22w2d
EDD(LMP) 07/11/2005
Fetus A/1
FetusPos
PLAC

<Measurement Type>
BPD(Hadlock)

GA(LMP) 22w2d
BPD 5.31 cm
GA 22w1d 40.4%

[cm]
BPD(Hadlock)
+2SD/-2SD
11
10
9
8
7
6
5
4
3
2
1
15
20
25
30
35
40
[Week]
PRESENT: +

Figure 9-7. Fetal Growth Curve Graph

Fetal Growth Curve Graph

The horizontal axis shows the fetal age in weeks. The system determines this age from the data on the Patient Data Entry screen. The vertical axis shows one of the following:

- For measurements, mm or cm
- For ratios, percent
- For fetal weight, grams

The Fetal Growth Curve Graph shows the following information for the selected measurement:

- The normal growth curve
- The standard deviations or relevant percentiles
- The gestational age of the fetus, using patient data (vertical dotted line)
- Using the current ultrasound measurement data, where the fetus is on the growth curve

The legend at the bottom of the graph shows the symbols and colors that indicate data for fetal trending (Past and Present) and multiple gestation (Fetus).

To select the measurement

To select which measurement you want to display on the Fetal Growth Curve Graph, do one of the following:

- To select a specific measurement:
  a. On the graph display, move the **Trackball** to the Measurement Type field and press **Set**.

     The system displays a list of measurements.

  b. Move the **Trackball** to select the desired measurement and press **Set**.

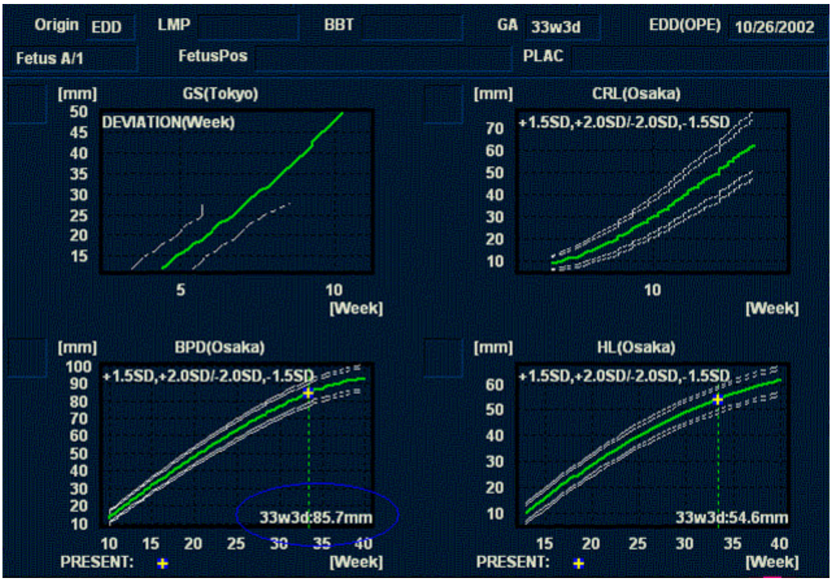
     The system displays the Fetal Growth Curve Graph for the selected measurement.
- To scroll through all Fetal Growth Curve Graphs, adjust the **Graph Change** control.

To select the age to use

To plot the fetus age, the system allows you to use the gestational age (GA) from the LMP, or to use the composite ultrasound age (CUA). To select, adjust the **Select GA** control. The information in the left column changes between CUA and GA(EDD), and the data may change.

To view a single or four graphs

You can view either a single Fetal Growth Curve Graph or you can view four graphs at the same time. To select each view, press ***Single*** or ***Quad***.



Origin EDD
LMP
BBT
GA 33w3d
EDD(OPE) 10/26/2002
Fetus A/1
FetusPos
PLAC

33w3d:85.7mm
33w3d:54.6mm

[mm]
GS(Tokyo)
DEVIATION(Week)
50
45
40
35
30
25
20
15
5
10
[Week]
[mm]
CRL(Osaka)
+1.5SD,+2.0SD/-2.0SD,-1.5SD
70
60
50
40
30
20
10
10
[Week]
[mm]
BPD(Osaka)
+1.5SD,+2.0SD/-2.0SD,-1.5SD
100
90
80
70
60
50
40
30
20
10
10
15
20
25
30
35
40
PRESENT:
[Week]
[mm]
HL(Osaka)
+1.5SD,+2.0SD/-2.0SD,-1.5SD
60
50
40
30
20
10
15
20
25
30
35
40
PRESENT:
[Week]

Figure 9-8. Fetal Growth Curve Graph: Quad View

The measurement values are displayed at the bottom of the graph.

To change measurements in quad view

When you view four graphs simultaneously, you can select which four you want to see. To change each graph in quad view:

1. On the graph display, use the **Trackball** to move the cursor to the small box that is upper left of each graph, then press **Set**.

   The system displays a list of measurements.
2. Move the **Trackball** to select the desired measurement and press **Set**.

   The system displays the Fetal Growth Curve Graph for the selected measurement.

To scroll through all Fetal Growth Curve Graphs, adjust the **Graph Change** control.

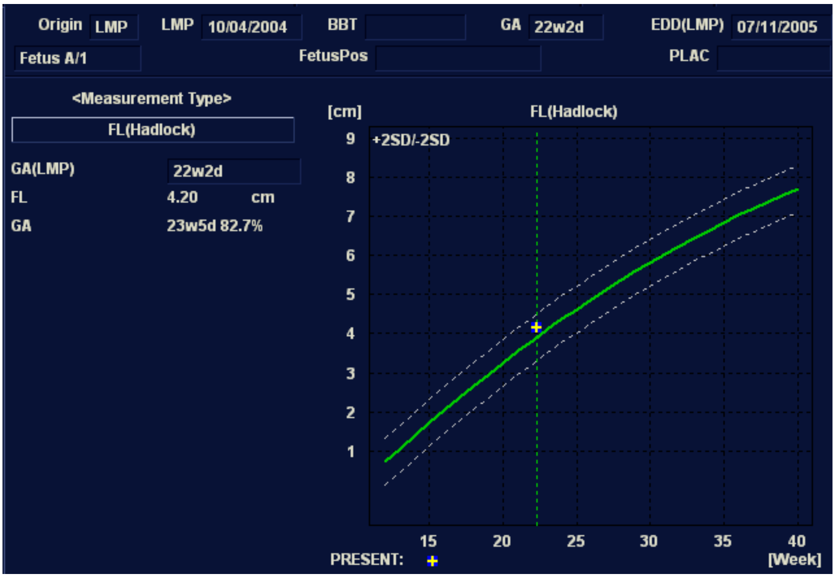
The order of a quad graph view can be saved by selecting **Save**.

Fetal Trending

When you have ultrasound data for more than one exam for a patient, you can use the data to look at fetal trending on the Fetal Growth Curve Graphs.

1. Select ***Graph Display*** and select the desired Fetal Growth Curve Graph.
2. Select ***Plot Both***.

   The system automatically finds the data from previous ultrasound exams, and displays it on the graph with the present data.



Origin LMP
LMP 10/04/2004
BBT
GA 22w2d
EDD(LMP) 07/11/2005
Fetus A/1
FetusPos
PLAC

<Measurement Type>
FL(Hadlock)

GA(LMP) 22w2d
FL 4.20 cm
GA 23w5d 82.7%

Figure 9-9. Fetal Trending on Fetal Growth Curve Graph: FL

The legend at the bottom of the graph shows the symbols and colors that indicate Past and Present data.

Fetal Trending (continued)

To manually enter past exam data

If you have data from a previous ultrasound exam that you want to use for fetal trending, but it is not in the system, you can manually enter the data.

1. After you have registered the patient for this exam, on the Patient Data Entry screen, in the Exam Information (Obstetrics) section, select Past Exam.

   The system displays the Input Past Exam screen. See Figure 9-10.
2. Enter the data from previous exams.
3. To enter data on page 2, select Next.
4. After you enter the previous exam data, select Exit to Save.

   The system saves the previous exam data. When you view the Fetal Growth Curve Graphs, select ***Plot Both*** to view fetal trending. The system automatically uses the data you entered.

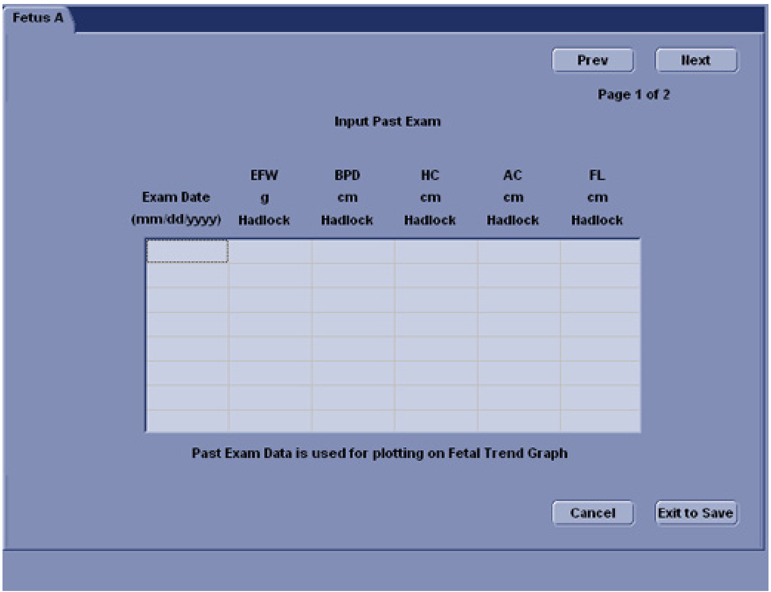
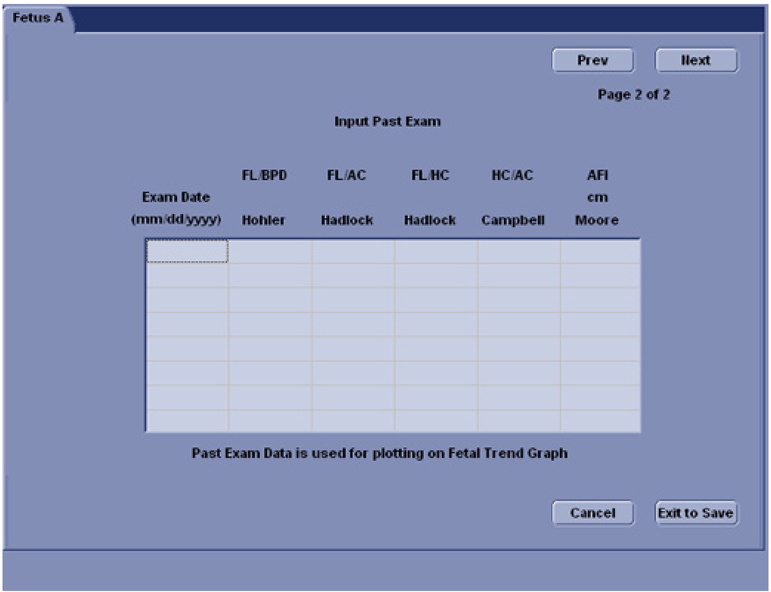

Fetus A
Prev
Next
Page 1 of 2
Input Past Exam
Exam Date (mm/dd/yyyy)
EFW g Hadlock
BPD cm Hadlock
HC cm Hadlock
AC cm Hadlock
FL cm Hadlock
Past Exam Data is used for plotting on Fetal Trend Graph
Cancel
Exit to Save

Figure 9-10. Input Past Exam screen, page 1

Fetal Trending (continued)


Fetus A
Prev
Next
Cancel
Exit to Save

Page 2 of 2

Input Past Exam

Exam Date (mm/dd/yyyy)	FL/BPD Hohler	FL/AC Hadlock	FL/HC Hadlock	HC/AC Campbell	AFI cm Moore

Past Exam Data is used for plotting on Fetal Trend Graph

Figure 9-11. Input Past Exam screen, page 2

To edit patient data

When you are working with graphs, you can change or enter the following patient data.

- GA(LMP) – this field is computed using the LMP date on the Patient Data Entry screen. To change this field:

NOTE: *You can only change this field on the Fetal Growth Curve Graph in single view.*

  a. Move the **Trackball** to the field, which is left of the graph. To select the field, press **Set**.

     The system displays a window with the GA weeks and days.

  b. To select each field, move the **Trackball** to the field and press **Set**.
  c. Type the correct weeks or days.
  d. Select OK.

     The system makes the following changes:

  - GA (LMP) is now GA (GA) and shows the age you entered.
  - In the Patient Data section, the GA changes.
  - In the Patient Data section, The EDD (LMP) changes to EDD(GA) and shows an updated date, using the GA you entered.

    The LMP is erased.

- FetusPos – type information about the fetus position.
- PLAC – type information about the placenta.

To return from a graph to the scan display

After viewing graphs, to return to the scan display, do one of the following:

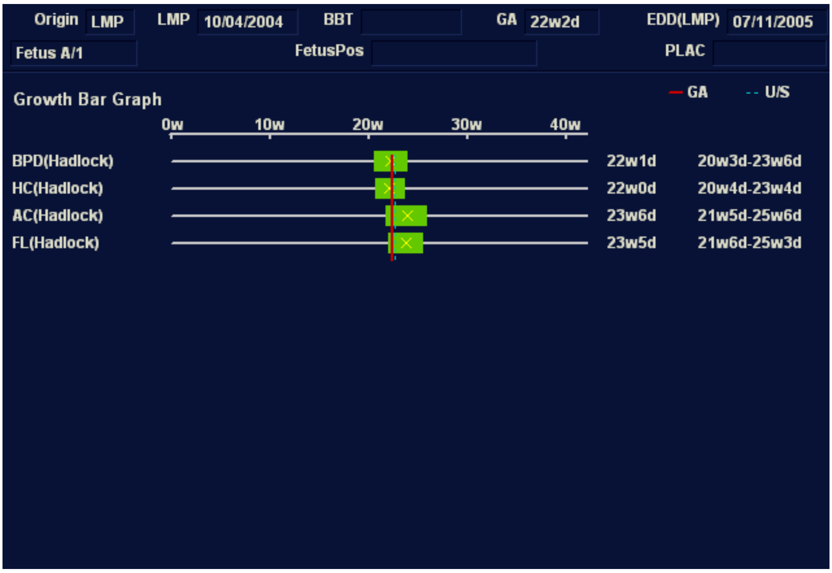
- On the graph display, select Exit.
- On the Top/Sub Menu, select ***Graph Display***.

Fetal Growth Bar Graph

The fetal growth bar graph shows current exam measurements and the normal growth range based on the gestational age. It shows all measurements on one graph.

To view the Fetal Growth Bar Graph:

1. Press **Measure**.
2. Select ***Graph***.
3. Select ***Bar***.



Origin LMP LMP 10/04/2004 BBT GA 22w2d EDD(LMP) 07/11/2005

Fetus A/1 FetusPos PLAC

Growth Bar Graph

BPD(Hadlock)	22w1d	20w3d-23w6d
HC(Hadlock)	22w0d	20w4d-23w4d
AC(Hadlock)	23w6d	21w5d-25w6d
FL(Hadlock)	23w5d	21w6d-25w3d

Figure 9-12. Fetal Growth Bar Graph

Fetal Growth Bar Graph (continued)

- The horizontal axis shows the gestational weeks.
- The red vertical line shows the gestational age using the patient data.
- The blue dotted vertical line shows the ultrasound age using the current measurements.
- The yellow x shows the ultrasound age for each measurement.
- The green rectangle shows the normal age range for the measurement.

You cannot do fetal trending or view multiple gestation data on the bar graph.

OB-Multigestational

Using other OB studies

The LOGIQ e system includes measurements for the following studies: USA, Europe, Tokyo, Osaka, and ASUM. The following figures show the OB Top/Sub Menu displays for the Tokyo and Osaka studies and for the ASUM studies. For information about how to change studies, refer to “Measurement and Analysis (M&A) System Presets” on page 16-10.

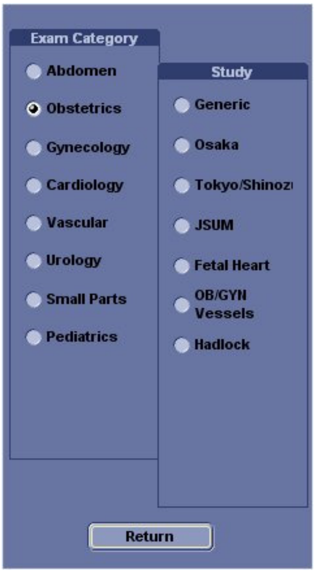

Exam Category
○ Abdomen
● Obstetrics
○ Gynecology
○ Cardiology
○ Vascular
○ Urology
○ Small Parts
○ Pediatrics
Study
○ Generic
○ Osaka
○ Tokyo/Shinozi
○ JSUM
○ Fetal Heart
○ OB/GYN Vessels
○ Hadlock
Return

Figure 9-13. OB Top/Sub Menu: Tokyo and Osaka studies

Using other OB studies (continued)

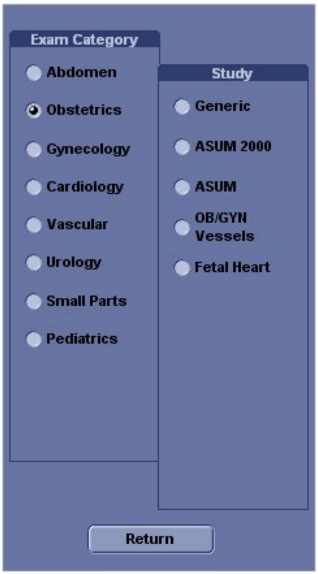

Exam Category
○ Abdomen
● Obstetrics
○ Gynecology
○ Cardiology
○ Vascular
○ Urology
○ Small Parts
○ Pediatrics
Study
○ Generic
○ ASUM 2000
○ ASUM
○ OB/GYN Vessels
○ Fetal Heart
Return

Figure 9-14. OB Top/Sub Menu: ASUM studies

NOTE: *ASUM studies include the following measurements:*

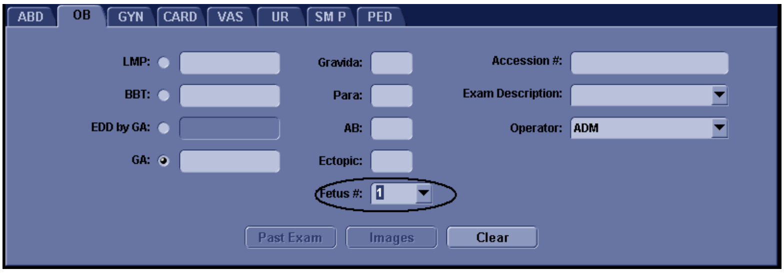
- ASUM: AC, BPD, and CRL
- ASUM 2001: AC, BPD, CRL, FL, HC, HL, and OFD

Multiple Fetus

LOGIQ e allows you to measure and report multiple fetus development. The system can report a maximum of four fetuses.

To enter the number of fetuses

If more than one fetus is imaged during the exam, enter the number of fetuses in the Patient Data Entry Menu.


ABD
OB
GYN
CARD
VAS
UR
SM P
PED
LMP: ○
BBT: ○
EDD by GA: ○
GA: ●
Gravida:
Para:
AB:
Ectopic:
Accession #:
Exam Description:
Past Exam
Images
Clear

Fetus #: 1

Operator: ADM

Figure 9-15. Fetus Number

When you start an OB exam, the system automatically fills in the Fetus # field with 1. To change the number:

1. Move the cursor to the fetus number and press **Set** twice.

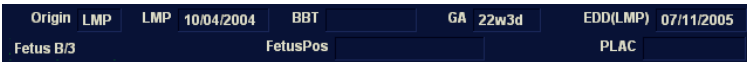
   The number is highlighted.
2. Type the correct number and press **Set**.

   The system displays a message to confirm that you want to change the fetus number.
3. Select Yes.

To identify each fetus

For measurements, calculations, and worksheet displays, the system labels each fetus A, B, C, or D. Each fetus is identified by a letter and the total number of fetuses. For example, fetus A/3 is fetus A from a total of 3.

When scanning, you can enter information about the fetus position and placenta location. You can enter the information in the Patient Data section of the worksheets and the graphs. You can type up to 23 characters in the FetusPos and PLAC fields.



Origin LMP
LMP 10/04/2004
BBT
GA 22w3d
EDD(LMP) 07/11/2005
Fetus B/3
FetusPos
PLAC

Figure 9-16. Patient Data section of the OB Worksheet

To select a fetus

During measurements and calculations, to change between fetuses, do one of the following:

- Adjust the **Fetus** selection.
- Move the **Trackball** to the Summary Window and select the fetus.

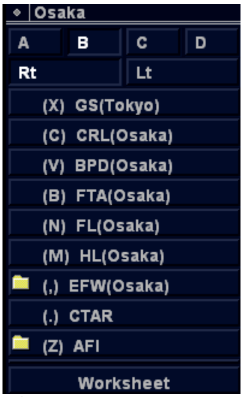

Osaka
A
B
C
D
Rt
Lt
(X) GS(Tokyo)
(C) CRL(Osaka)
(V) BPD(Osaka)
(B) FTA(Osaka)
(N) FL(Osaka)
(M) HL(Osaka)
(,) EFW(Osaka)
(.) CTAR
(Z) AFI
Worksheet

Figure 9-17. Summary Window: Multiple fetus

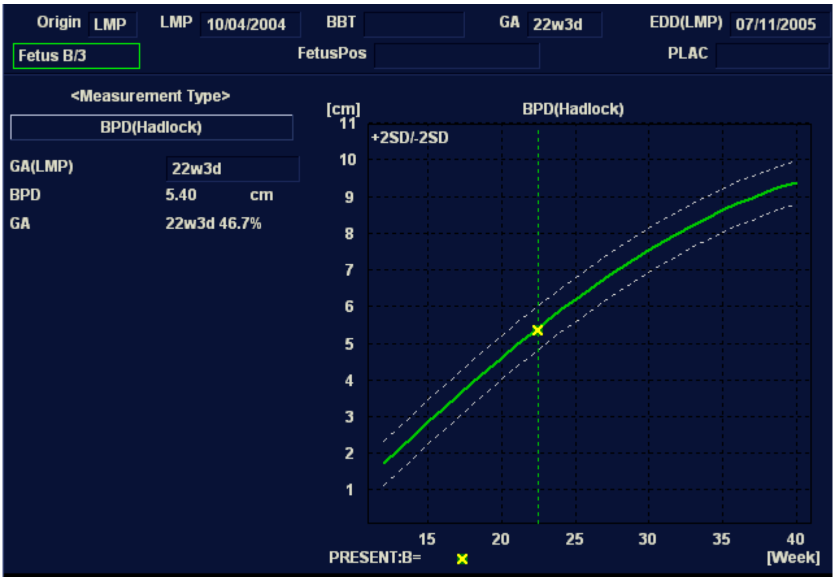
You can change between fetuses at any time during the exam.

NOTE: *After you change to the next fetus, any measurements you make are recorded and reported to that fetus. If you have any active measurement or calculation that is not completed when you change the fetus, the system cancels the measurement or calculation.*

To view multiple fetuses data on graphs

You can view multiple gestation data on fetal growth curve graphs. After you have made measurements for each fetus, select ***Graph Display***.

- To view the graph for each fetus, do one of the following:
  - Adjust the **Fetus** selection.
  - In the Patient Data section, move the **Trackball** to highlight the FetusNo field. In the list of fetuses, move the **Trackball** to select the fetus you want, and press **Set**.
- To display data for multiple fetuses on the same graph, select ***Fetus Compare***.



Origin LMP
LMP 10/04/2004
BBT
GA 22w3d
EDD(LMP) 07/11/2005
Fetus B/3
FetusPos
PLAC

<Measurement Type>
BPD(Hadlock)
GA(LMP) 22w3d
BPD 5.40 cm
GA 22w3d 46.7%

Figure 9-18. Fetal Growth Curve Graph: Fetus Compare

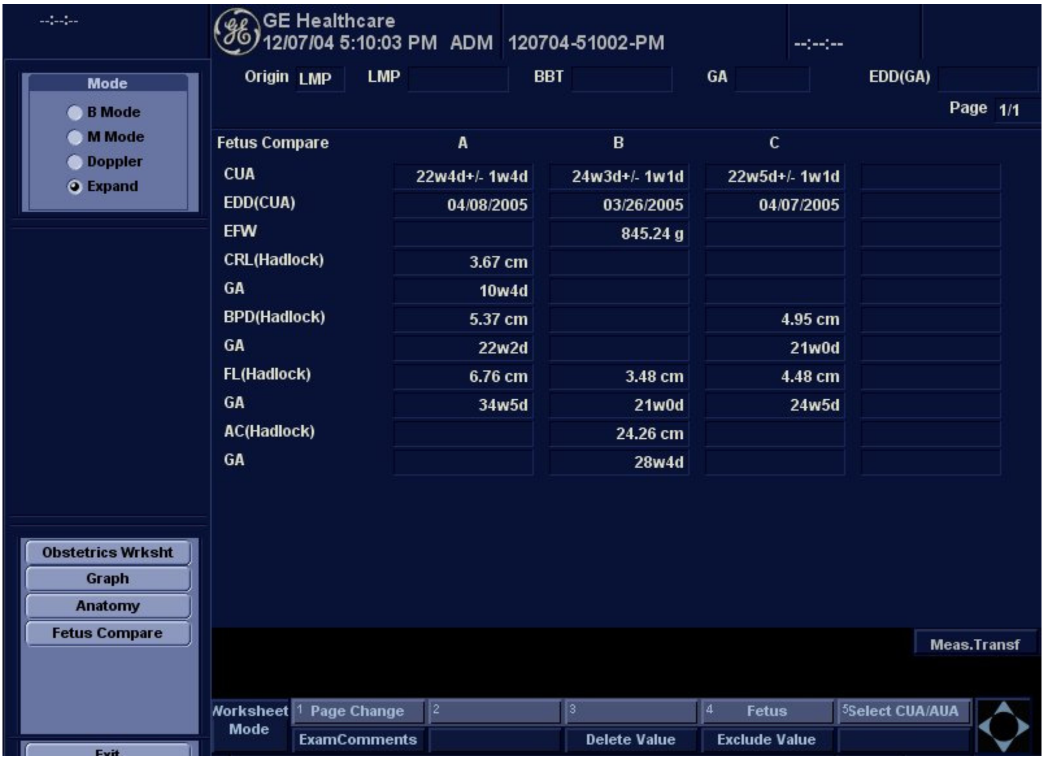
The legend at the bottom of the graph shows the symbols and colors that represent each fetus.

To compare multiple fetus data on a worksheet

With multiple fetuses, you can list and compare measurements of the fetuses on the worksheet.

Select ***Worksheet Display***, then select ***Fetus Compare***.

When you select ***Fetus Compare***, the system lists the measurement results for each fetus on the Worksheet.


--:--:--
GE Healthcare
Mode
○ B Mode
○ M Mode
○ Doppler
● Expand
Obstetrics Wrksht
Graph
Anatomy
Fetus Compare
Exit
Meas.Transf
Worksheet Mode
1 Page Change
2
3
4 Fetus
5 Select CUA/AUA
ExamComments
Delete Value
Exclude Value

12/07/04 5:10:03 PM ADM 120704-51002-PM --:--:--

Origin LMP LMP BBT GA EDD(GA)

Page 1/1

Fetus Compare	A	B	C	
CUA	22w4d+/- 1w4d	24w3d+/- 1w1d	22w5d+/- 1w1d	
EDD(CUA)	04/08/2005	03/26/2005	04/07/2005	
EFW		845.24 g		
CRL(Hadlock)	3.67 cm			
GA	10w4d			
BPD(Hadlock)	5.37 cm		4.95 cm	
GA	22w2d		21w0d	
FL(Hadlock)	6.76 cm	3.48 cm	4.48 cm	
GA	34w5d	21w0d	24w5d	
AC(Hadlock)		24.26 cm		
GA		28w4d		

Figure 9-19. Worksheet Display with Fetus Compare

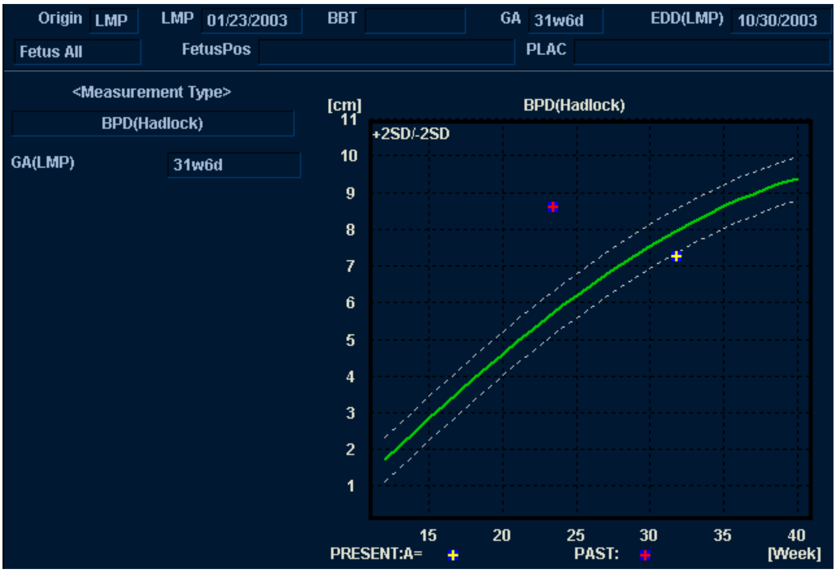
To Show Fetal Trending for Multiple Fetuses

When you have data for more than one exam, you can show fetal trending and compare fetuses on one graph.

To view fetal trending for multiple fetuses:

1. Select ***Graph Display***.
2. Select ***Fetus Compare***.
3. Select ***Plot Both***.

NOTE: You can only view fetal trending for multiple fetuses in single graph display.



Origin LMP
LMP 01/23/2003
BBT
GA 31w6d
EDD(LMP) 10/30/2003
Fetus All
FetusPos
PLAC
<Measurement Type>
BPD(Hadlock)
GA(LMP) 31w6d

Figure 9-20. Multigestation Fetal Growth Curve Graph

The symbol key for fetal trending and multiple fetuses is shown at the bottom of the graph.

OB Table Editor

You can add user programmable OB tables to the system.

OB Table Settings Menu

You add OB Tables in the Measurement & Analysis menu. To open the menu:

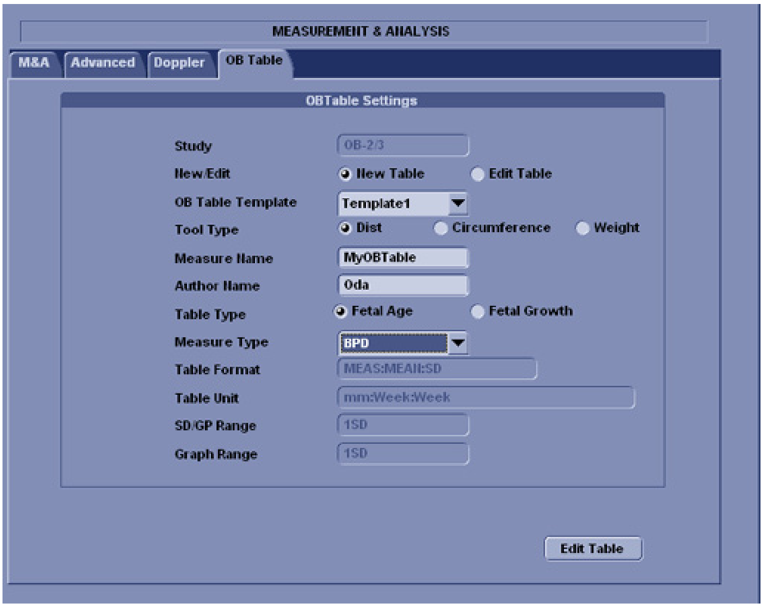
1. On the Top/Sub Menu, select ***Utility***, then select ***M&A***.
2. Check the Exam Category on the far left of the monitor screen. Make sure that Obstetrics is selected.

   If it is not selected, select Obstetrics and continue selecting the folders until the appropriate area is selected as to where this new OB Table will be entered. For example, select Obstetrics, then select OB-2/3. If there are further folders within OB-2/3, select that appropriate folder.

OB Table Settings Menu (continued)

3. On the monitor display, select the OB Table tab.

   The system displays the OB Table settings menu.


MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
OBTable Settings
Edit Table

Study: OB-2/3
New/Edit: ● New Table ○ Edit Table
OB Table Template: Template1
Tool Type: ● Dist ○ Circumference ○ Weight
Measure Name: MyOBTable
Author Name: Oda
Table Type: ● Fetal Age ○ Fetal Growth
Measure Type: BPD
Table Format: MEAS:MEAN:SD
Table Unit: mm:Week:Week
SD/GP Range: 1SD
Graph Range: 1SD

Figure 9-21. OB Table settings

OB Table Settings Menu (continued)

4. The OB Table settings menu lists OB Table parameters. Specify the following parameter values as appropriate:
   - **Study**: Shows the study to which this measurement table belongs.
   - **New/Edit**: To create a new OB table, select New Table. To edit an existing user-programmable OB table, select Edit Table.

NOTE: *You cannot edit the system's OB Tables.*

   - **OB Table Template**: To create a new OB table, select the Template (1 - 7) which you want to use as the basis of the user programmable OB Table. See 'OB Table Templates' on *page 9-74 for more information.*

     To edit an existing user OB table, select the desired OB table to edit.
   - **Tool Type**: Select the type of measurement: Distance or Circumference.
   - **Measure Name**: Type the name of measurement that will display on the Top/Sub Menu.
   - **Author Name**: Type the author's name.
   - **Table Type**: If necessary, select the Table Type: Fetal Age or Fetal Growth.
   - **Measure Type**: Select a measurement type that can be used to calculate EFW, for example BPD.

NOTE: *Measure Type is used only when calculating EFW.*

NOTE: *The following items are display only: Table Format, Table Unit, SD/GP Range, and Graph Range. The system determines these values automatically, based on the type of OB table you are creating.*

5. After specifying all parameter values, move the **Trackball** to *Edit Table* and press **Set**.

   The system displays the Edit Menu.

NOTE: *If any of the OB table parameters are not correct, the Edit Menu is not displayed.*

OB Table Templates

Tool Type:

- Distance: 2D Caliper
- Circumference: 2D Ellipse, 2D Trace, 2D Caliper

Template 1

Table 9-4: Template 1 (based on Hadlock)

Template 1: SD Range Table				
Fetal Age Table	Table Format	MEAS	MEAN	SD
	Table Unit	mm	Week	Week
	Table Range	1SD		
	Graph Range	1SD		
Measurement Result	Value [cm]			
	GA [#w#d]			
	Min [#w#d]			
	Max [#w#d]			
Fetal Growth Table	Table Format	AGE	MEAN	SD
	Table Unit	Week	mm	Week
	Others are same as above			

Template 2

Table 9-5: Template 2 (based on Tokyo)

Template 2: SD Range Table				
Fetal Age Table	Table Format	MEAS	MEAN	SD
	Table Unit	mm	Day	Day
	Table Range	1SD		
	Graph Range	1SD		
Measurement Result	Value [cm]			
	GA [#w#d]			
	SD: day(+/-)			
Fetal Growth Table	Table Format	AGE	MEAN	SD
	Table Unit	Day	mm	Day
	Others are same as above			

Template 3

Table 9-6: Template 3 (based on Osaka)

Template 3: SD Table				
Fetal Age Table	Table Format	MEAS	MEAN	SD
	Table Unit	mm	Day	mm
	Table Range	1SD		
	Graph Range	1SD		
Measurement Result	Value [cm]			
	GA [#w#d]			
	SD: sd=(mv-pv)/sd			
Fetal Growth Table	Table Format	AGE	MEAN	SD
	Table Unit	Day	mm	Day
	Others are same as above			

Template 4

Table 9-7: Template 4 (based on several European tables)

Template 4: 5%-95% Table				
Fetal Age Table	Table Format	MEAS	MEAN	SD
	Table Unit	mm	WeekDay	mm
	Table Range	5%:95%		
	Graph Range	5%:95%		
Measurement Result	Value [cm]			
	GA [#w#d]			
	GP [%] GP is calculated by Fetal Growth Table. If you did not edit Growth Table, GP is not calculated by the system,			
Fetal Growth Table	Table Format	AGE	MEAN	SD
	Table Unit	WeekDay	mm	Day
	Table Range	5%:95%		
	Graph Range	5%:95%		

Template 5

Table 9-8: Template 5 (based on several European tables)

Template 5: 5% - 95% Table				
Fetal Age Table	Table Format	MEAS	MEAN	SD
	Table Unit	mm	WeekDay	mm
	Table Range	1SD		
	Graph Range	5%:95%		
Measurement Result	Value [cm]			
	GA [#w#d]			
	GP [%] GP is calculated by Fetal Growth Table. If you did not edit Growth Table, GP is not calculated by the system,			
Fetal Growth Table	Table Format	AGE	MEAN	MAX
	Table Unit	WeekDay	mm	mm
	Table Range	1SD		
	Graph Range	5%:95%		

Template 6

Table 9-9: Template 6 (based on several European tables)

Template 6: 10% - 90% Table					
Fetal Age Table	Table Format	MEAS	MIN	MEAN	SD
	Table Unit	mm	WeekDay	WeekDay	WeekDay
	Table Range	10%-90%			
	Graph Range	10%-90%			
Measurement Result	Value [cm]				
	GA [#w#d]				
	GP [%] GP is calculated by Fetal Growth Table. If you did not edit Growth Table, GP is not calculated by the system,				
Fetal Growth Table	Table Format	AGE	MIN	MEAN	SD
	Table Unit	WeekDay	mm	mm	mm
	Table Range	10%-90%			
	Graph Range	10%-90%			

Template 7

Table 9-10: Template 7 (Based on several european tables)

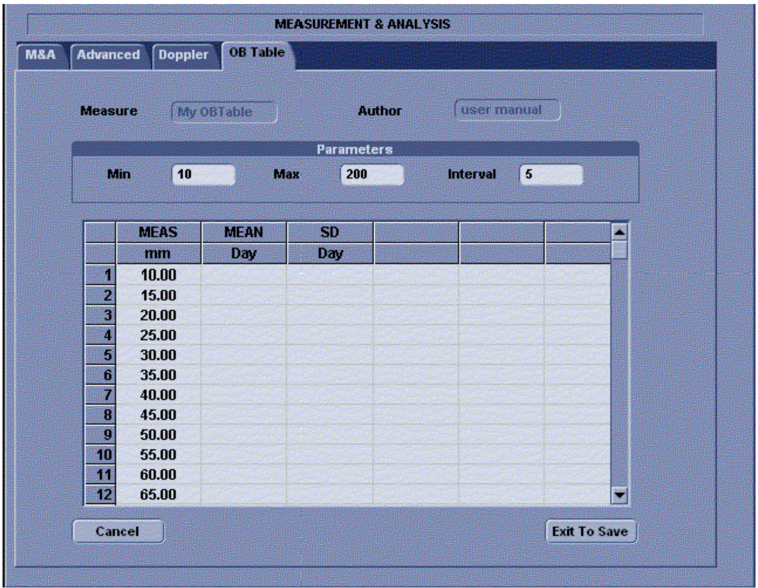
Template 7: 10% - 90% Table				
Fetal Age Table	Table Format	MEAS	MEAN	SD
	Table Unit	mm	WeekDay	mm
	Table Range	1SD		
	Graph Range	10%:90%		
Measurement Result	Value [cm]			
	GA [#w#d]			
	GP [%] GP is calculated by Fetal Growth Table. If you did not edit Growth Table, GP is not calculated by the system,			
Fetal Growth Table	Table Format	AGE	MEAN	MAX
	Table Unit	WeekDay	mm	mm
	Table Range	1SD		
	Graph Range	10%:90%		

OB Table Edit Menu

The data you enter in the OB Table Edit Menu depends on whether the table type is Fetal Age or Fetal Growth.

Fetal Age Table

If you are creating or editing a Fetal Age table, the OB Table Edit Menu is as follows:


MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Cancel
Exit To Save

Measure: My OBTable

Author: user manual

Parameters

Min: 10

Max: 200

Interval: 5

	MEAS	MEAN	SD			
	mm	Day	Day			
1	10.00					
2	15.00					
3	20.00					
4	25.00					
5	30.00					
6	35.00					
7	40.00					
8	45.00					
9	50.00					
10	55.00					
11	60.00					
12	65.00					

Figure 9-22. OB Table Edit Menu: Fetal Age Table

Complete the field

1. Input value to Min, Max and Interval of the Parameters field.

   The system automatically fills in the MEAS column.

   Input value to the columns of MEAN and SD.

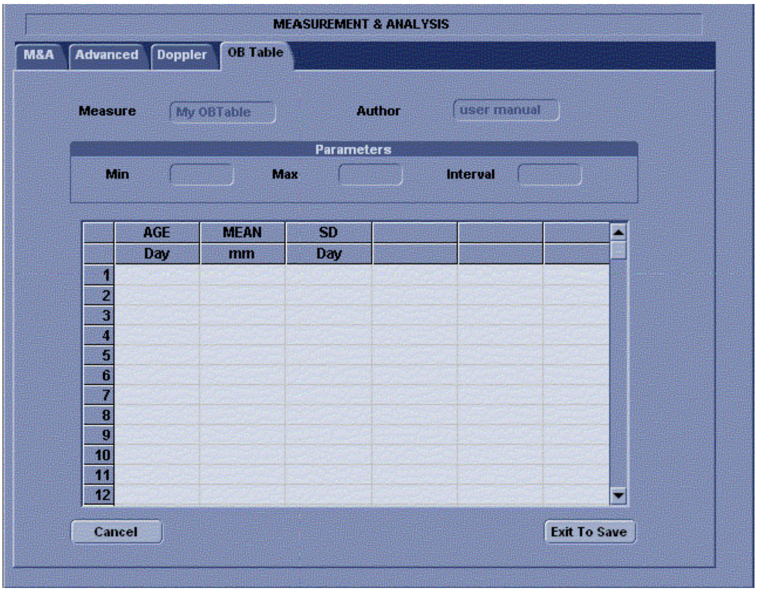
NOTE: *To move between the fields in the table, use the up, down, left, and right arrow keys.*

NOTE: *You must enter a minimum of two rows of data. Any lines with a blank cell are not saved.*

To save the Table Data, move the **Trackball** to Exit to Save and press **Set**. If you want cancel this table, move the **Trackball** to Cancel and press **Set**.

Fetal Growth Table

If you are creating or editing a Fetal Growth table, the OB Table Edit Menu is as follows:



Measure: My OBTable

Author: user manual

Min:

Max:

Interval:

	AGE	MEAN	SD			
	Day	mm	Day			
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

Figure 9-23. OB Table Edit Menu: Fetal Growth Table

Complete the field

1. Input value to the required columns.

   NOTE: To move between the fields in the table, use the up, down, left, and right arrow keys.

   NOTE: You must enter a minimum of two rows of data. Any lines with a blank cell are not saved.

2. To save the Table Data, move the **Trackball** to Exit to Save and press **Set**. If you want cancel this table, move the **Trackball** to Cancel and press **Set**.

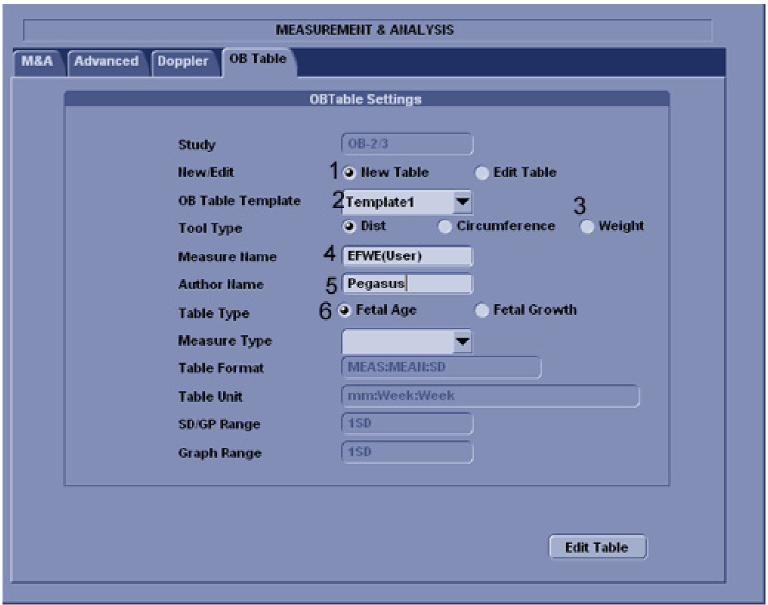
After you complete the OB table, it is now available for the selected study. To use the measurement, you must assign it to a Top/Sub Menu. See ‘Measurement and Calculation Setup’ on *page 7-14 for more information.*

EFW for OB User Table/Formula Editor

EFW Table Editor

You can edit an EFW Formula at the OB Table Editor.

1. Select Utility -> Measure -> OB Table.
2. Select the appropriate parameters and press ***Edit Table***.
    - New/Edit: Select “New Table”
    - OB Table Template: Select appropriate template.
    - Tool Type: Select “Weight”
    - Measure Name: Enter measurement name.
    - Author Name: Enter author’s name.
    - Table Type: Select “Fetal Age”



Study: OB-2/3

New/Edit: 1 ● New Table ○ Edit Table

OB Table Template: 2 Template1

Tool Type: ● Dist ○ Circumference 3 ○ Weight

Measure Name: 4 EFWE(User)

Author Name: 5 Pegasus

Table Type: 6 ● Fetal Age ○ Fetal Growth

Measure Type:

Table Format: MEAS:MEAN:SD

Table Unit: mm:Week:Week

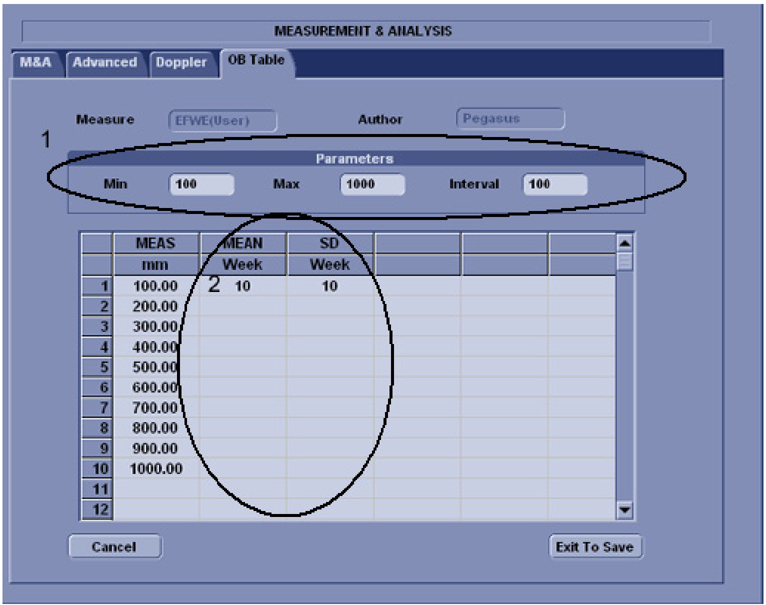
SD/GP Range: 1SD

Graph Range: 1SD

Figure 9-24. OB Table Tab Screen

EFW Table Editor (continued)

3. Edit the table data and press ***Exit To Save***.


MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
1
2
Cancel
Exit To Save

Measure EFWE(User)

Author Pegasus

Parameters

Min 100 Max 1000 Interval 100

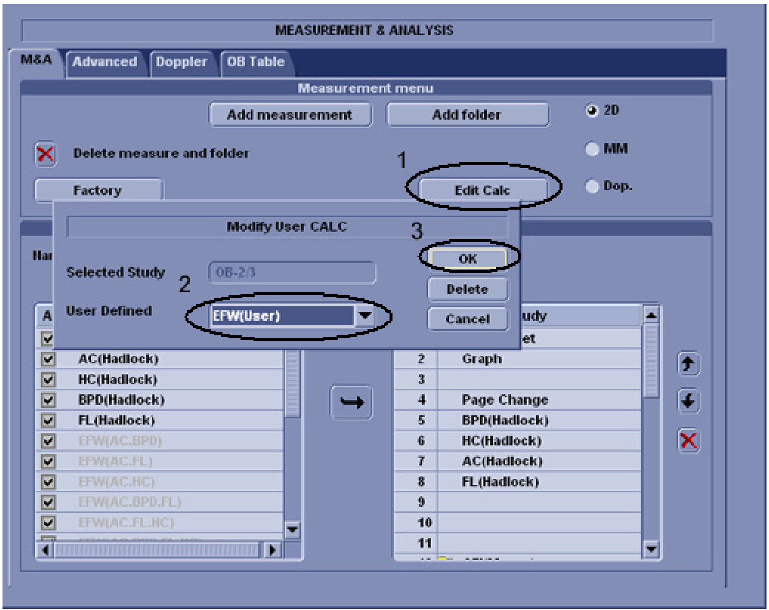
	MEAS	MEAN	SD			
	mm	Week	Week			
1	100.00	10	10			
2	200.00					
3	300.00					
4	400.00					
5	500.00					
6	600.00					
7	700.00					
8	800.00					
9	900.00					
10	1000.00					
11						
12						

Figure 9-25. OB Table Editor Screen

EFW Formula Editor

1. Select the M&A tab and select ***Edit Calc***. The Modify User CALC window displays.

   Select the added table [e.g. EFW (User)(Pegasus)] from the User Defined pull-down menu and press ***OK***.


MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
2D
MM
Dop.
Delete measure and folder
Factory
Edit Calc
1
Modify User CALC
3
OK
Delete
Cancel
2
AC(Hadlock)
HC(Hadlock)
BPD(Hadlock)
FL(Hadlock)
EFW(AC.BPD)
EFW(AC.FL)
EFW(AC.HC)
EFW(AC.BPD.FL)
EFW(AC.FL.HC)
2 Graph
3
4 Page Change
5 BPD(Hadlock)
6 HC(Hadlock)
7 AC(Hadlock)
8 FL(Hadlock)
9
10
11

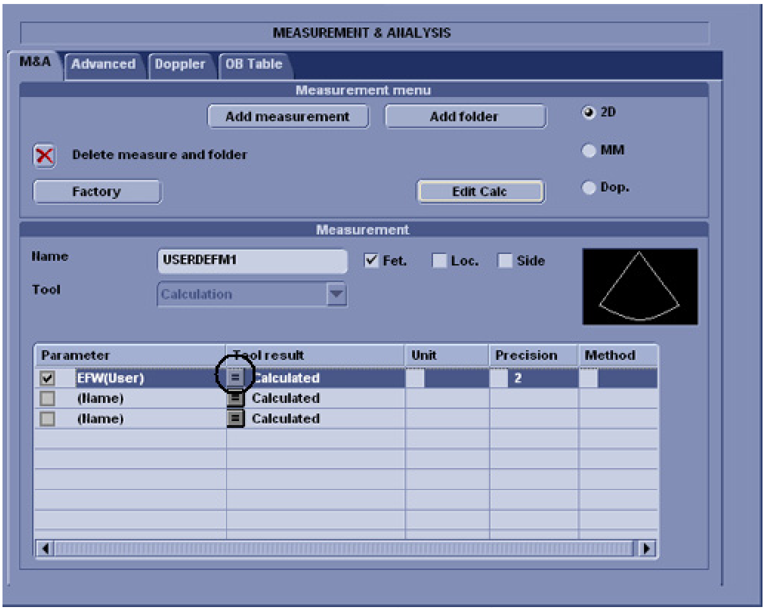
Selected Study: OB-2/3

User Defined: EFW(User)

Figure 9-26. Modify User CALC window

EFW Formula Editor (continued)

2. Select the “Calculated” button for the EFW parameter.


MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
Delete measure and folder
Factory
Edit Calc
Measurement

● 2D
○ MM
○ Dop.

Name USERDEFM1

Tool Calculation

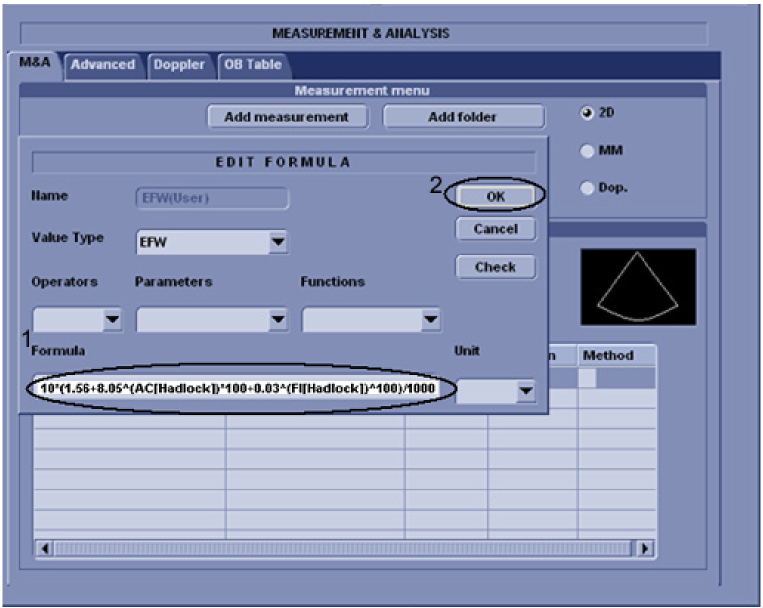
☑ Fet. ☐ Loc. ☐ Side

	Parameter	Tool result	Unit	Precision	Method
☑	EFW(User)	Calculated		2	
☐	(Name)	Calculated			
☐	(Name)	Calculated			

Figure 9-27. M&A Tab Screen

EFW Formula Editor (continued)

3. The EDIT FORMULA window displays. Edit the formula and select ***OK***.


MEASUREMENT & ANALYSIS
M&A
Advanced
Doppler
OB Table
Measurement menu
Add measurement
Add folder
2D
MM
Dop.
EDIT FORMULA
2
OK
Cancel
Check
Operators
Parameters
Functions
1
Unit
Method

Name: EFW(User)

Value Type: EFW

Formula: 10^(1.56+8.05^(AC[Hadlock])*100+0.03^(Fl[Hadlock])^100)/1000

Figure 9-28. EDIT FORMULA window

NOTE: When you edit a formula, be careful of the following points.

- If you want to calculate EFW by centimeter, add “ *100 ” to the {parameter}.
- If EFW is calculated in grams, add “ /1000 “ to the formula.

or example,

10^(1.56{AC[Hadlock]}*100+0.08*{FL[Hadlock]}*100)/1000

GYN Measurements

Introduction

The Gynecology exam category includes the following three studies:

- Generic. This study is common to all exam categories. See 'Generic Measurements' on *page 7-67 for more information.*
- General Gynecology. This study includes uterine, ovarian, ovarian follicle, and endometrium measurements.
- OB/GYN Vessel. This study includes the following vessels: uterine, ovarian, umbilical, middle cerebral artery, aorta, placenta, and descending aorta.

NOTE: The calculation formulas are listed in the Advanced Reference Manual.

To Start a Gynecology Exam

To begin a gynecology exam, you enter patient data or, if the patient data from a previous exam is saved in the system, find the patient information.

For details about how to start an exam, See ‘To Start an Obstetrics Exam’ on *page 9-4 for more information.*

After you complete the patient information, you can begin the scan.

1. To change from the Patient Data Entry screen to the Scan screen, do one of the following:
    - On the keyboard, press ***Esc***.
    - On the Control Panel, select **Patient** or **Freeze**.
    - On the Control Panel, press the B-Mode key.

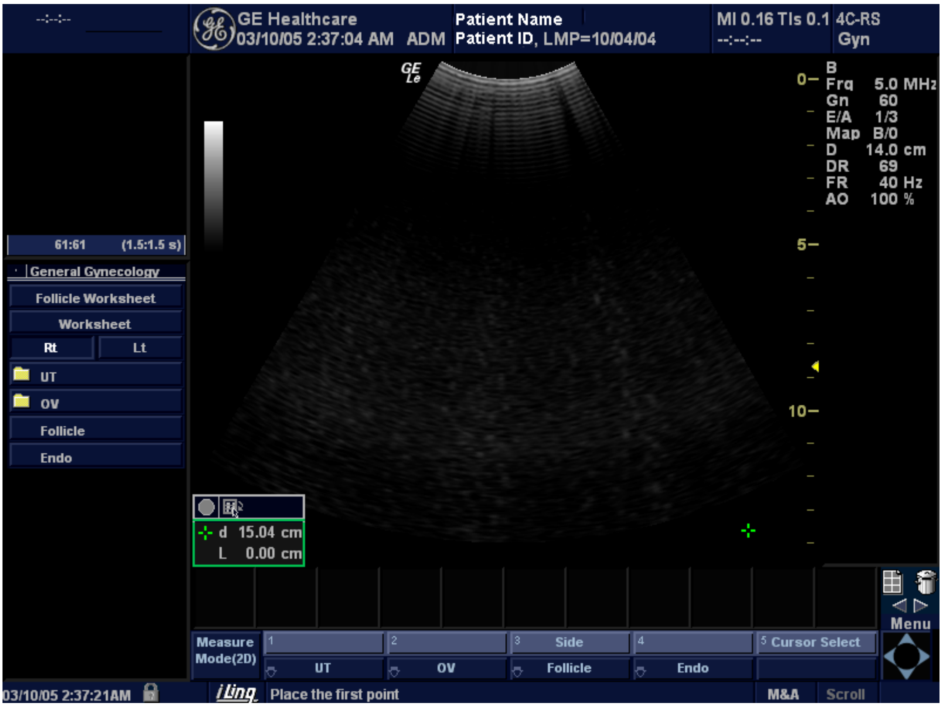
      The system displays the Scan screen.
2. To choose the appropriate probe, select the probe icon on the Top/Sub Menu.
3. On the Control Panel, press ***Measure***.

   The default Gynecology study is displayed on the Top/Sub Menu.

B-Mode Measurements

In B-Mode, you make the measurements in the General Gynecology study. These measurements include:

- Uterine length, width, and height
- Ovarian length, width, and height
- Ovarian follicle
- Endometrium thickness


GE Healthcare
03/10/05 2:37:04 AM ADM
Patient Name
Patient ID, LMP=10/04/04
MI 0.16 TIs 0.1
4C-RS
Gyn
61:61 (1.5:1.5 s)
General Gynecology
Follicle Worksheet
Worksheet
Rt
Lt
UT
OV
Follicle
Endo
0
5
10
Measure Mode(2D)
1
2
3 Side
4
5 Cursor Select
UT
OV
Follicle
Endo
Menu
03/10/05 2:37:21AM
M&A
Scroll

B
Frq 5.0 MHz
Gn 60
E/A 1/3
Map B/0
D 14.0 cm
DR 69
FR 40 Hz
AO 100 %

d 15.04 cm
L 0.00 cm

Place the first point

Figure 9-29. General Gynecology study

Follicle measurements

You can make left and right ovary follicle measurements from one, two, or three distances.

One distance

1. To select the left or right, adjust the **Side** selection.
2. Select ***Follicle***; an active caliper displays.
3. To position the active caliper at the start point, move the **Trackball**.
4. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
5. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
6. To complete the measurement, press **Set**.
7. Press **Clear**.

   The system displays the ovary follicle measurement in the Results Window.

Follicle measurements (continued)

Two distances

1. To select the left or right, adjust the **Side** selection.
2. Select ***Follicle***; an active caliper displays.
3. Make the first distance measurement:
    a. To position the active caliper at the start point, move the **Trackball**.
    b. To fix the start point, press **Set**.

       The system fixes the first caliper and displays a second active caliper.
    c. To position the second active caliper at the end point, move the **Trackball**.

       A dotted line connects the measurement points.
    d. To complete the measurement, press **Set**.

       The system displays the distance value in the Results Window and displays an active caliper.
4. To make the second distance measurement, repeat steps a–d above.
5. Press **Clear**.

   The system displays the ovary follicle measurement in the Results Window.

Follicle measurements (continued)

Three distances

1. To select the left or right, adjust the **Side** selection.
2. Select ***Follicle***; an active caliper displays.
3. Make the first distance measurement:
    a. To position the active caliper at the start point, move the **Trackball**.
    b. To fix the start point, press **Set**.

       The system fixes the first caliper and displays a second active caliper.
    c. To position the second active caliper at the end point, move the **Trackball**.

       A dotted line connects the measurement points.
    d. To complete the measurement, press **Set**.

       The system displays the distance value in the Results Window. After the first and second distance measurement, the system displays an active caliper.
4. To make the second and third distance measurement, repeat steps a–d above.

   After the third measurement, the system displays the ovary follicle measurement in the Results Window.

Endometrium thickness (Endo)

To measure the endometrium thickness, make one distance measurement.

1. Select ***Endo***; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the endometrium thickness in the Results Window.

Ovary length, width, and height

You can measure the length, width, and height of the left and right ovaries. Each measurement is a typical distance measurement made in the appropriate scan plane.

Typically, length and height are measured on the saggital plane while the width is measured on the axial/transverse plane.

To measure ovarian length, width, or height:

1. Scan the patient's right or left ovary in the appropriate plane.
2. To select left or right, adjust the **Side** selection.
3. Select the ***OV*** folder, then select ***OV L***, ***OV W***, or ***OV H***.
4. Perform a standard distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper, if preset accordingly.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window. After the first and second measurement, the system displays an active caliper for the next measurement.
5. To make the second and third distance measurements, repeat steps 3–4.

   After you complete the length, width, and height measurements, the system displays the ovarian volume in the Results Window.

Uterus length, width, and height

Each of these is a standard distance measurement. Typically, length and height are measured on the saggital plane while the width is measured on the axial/transverse plane.

To measure uterus length, width, or height:

1. Scan the patient in the appropriate scan plane.
2. Select the ***UT*** folder, then select ***UT L***, ***UT W***, or ***UT H***.

   An active caliper displays.
3. Perform a standard distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

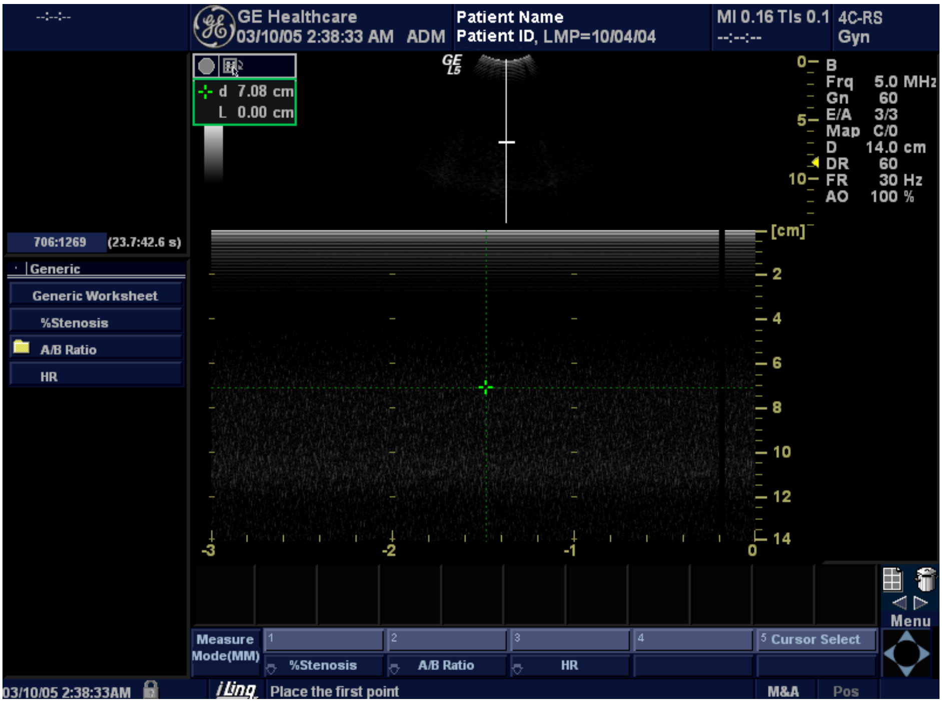
      The system displays the distance value in the Results Window. After the first and second measurement, the system displays an active caliper for the next measurement.
4. To make the second and third distance measurement, repeat steps 2–3.

   After you complete the third distance measurement, the system displays the uterine volume in the Results Window.

M-Mode Measurements

M-Mode measurements for the Gynecology exam are identical to M-Mode measurements for the Obstetrics exam. These measurements include % stenosis, A/B ratio, and heart rate.

For details regarding these measurements, See 'M-Mode Measurements' on *page 9-38 for more information.*



GE Healthcare
03/10/05 2:38:33 AM ADM
Patient Name
Patient ID, LMP=10/04/04
MI 0.16 TIs 0.1
4C-RS
Gyn

d 7.08 cm
L 0.00 cm

B
Frq 5.0 MHz
Gn 60
E/A 3/3
Map C/0
D 14.0 cm
DR 60
FR 30 Hz
AO 100 %

706:1269 (23.7:42.6 s)

Place the first point

03/10/05 2:38:33AM

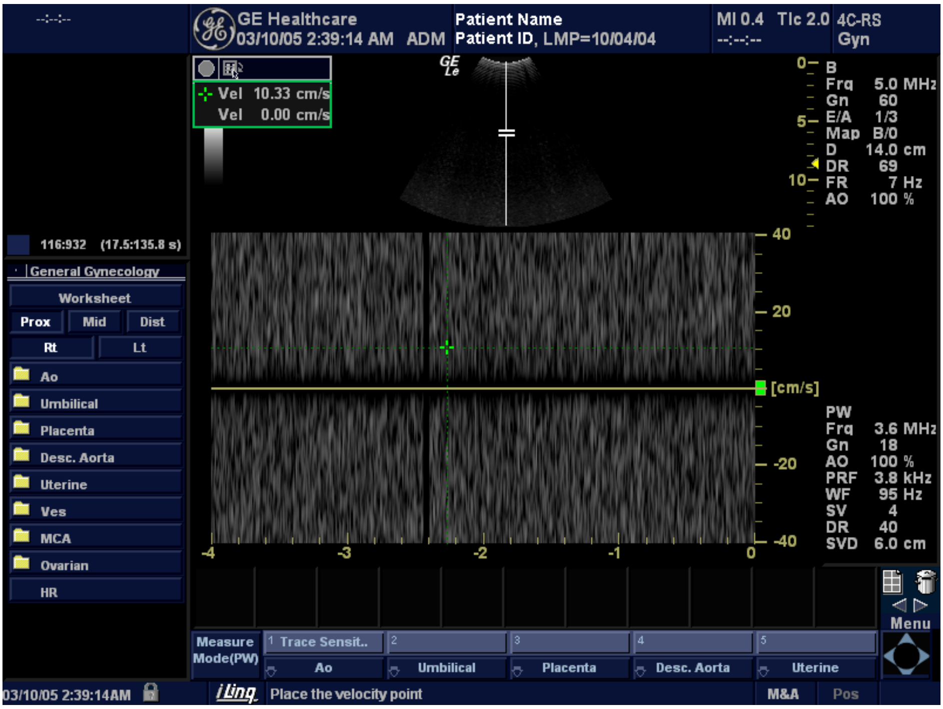
--:--:--
Generic
Generic Worksheet
%Stenosis
A/B Ratio
HR
[cm]
0
5
10
2
4
6
8
10
12
14
-3
-2
-1
0
Menu
Measure Mode(MM)
1
2
3
4
5 Cursor Select
%Stenosis
A/B Ratio
HR
iLinq
M&A
Pos

Figure 9-30. M-Mode Generic study

Doppler Mode Measurements

Doppler measurements for the Gynecology exam are identical to Doppler measurements for the Obstetrics exam. These measurements include the following vessels: uterine, ovarian, umbilical, middle cerebral artery, aorta, placenta, and descending aorta. For each vessel, you can make any of the following measurements: peak systole, minimum diastole, end diastole, heart rate, TAMAX, pulsatility index, resistive index, acceleration, PS/ED, ED/PS, and acceleration time.

For details regarding these measurements, See 'Doppler Mode Measurements' on *page 9-39 for more information.*



GE Healthcare 03/10/05 2:39:14 AM ADM

Patient Name

Patient ID, LMP=10/04/04

MI 0.4 TIc 2.0 4C-RS Gyn

Vel 10.33 cm/s

Vel 0.00 cm/s

116:932 (17.5:135.8 s)

B
Frq 5.0 MHz
Gn 60
E/A 1/3
Map B/0
D 14.0 cm
DR 69
FR 7 Hz
AO 100 %

PW
Frq 3.6 MHz
Gn 18
AO 100 %
PRF 3.8 kHz
WF 95 Hz
SV 4
DR 40
SVD 6.0 cm

03/10/05 2:39:14AM

Place the velocity point

--:--:--
General Gynecology
Worksheet
Prox
Mid
Dist
Rt
Lt
Ao
Umbilical
Placenta
Desc. Aorta
Uterine
Ves
MCA
Ovarian
HR
0
5
10
40
20
[cm/s]
-20
-40
-4
-3
-2
-1
0
Menu
Measure Mode(PW)
1 Trace Sensit..
2
3
4
5
Ao
Umbilical
Placenta
Desc. Aorta
Uterine
iLinq
M&A
Pos

Figure 9-31. Doppler Mode General Gynecology study

Chapter 10

Cardiology

Describes how to perform cardiac measurements and calculations.

Cardiology Exam Preparation

Introduction

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements is not only determined by the system accuracy, but also by use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigators are so noted. Be sure to refer to the original article describing the investigator's recommended clinical procedures.

General Guidelines

New Patient information must be entered before beginning an exam. See ‘Beginning a New Patient’ on *page 4-3 for more information.*

Any measurement can be repeated by selecting that measurement again from the Top/Sub Menu Menu.

Cardiology Measurements

Overview

Cardiology measurements offer two different types of measurement studies, Generic and Cardiac.

- Generic – Each exam category has a Generic study. The Generic studies provide you quick access to measurements such as volume, angle, A/B ratio, and % stenosis. For details on most of the generic measurements, See 'Generic Measurements' on *page 7-67 for more information.* This chapter includes a section describing generic measurements that are specific to the cardiac exam category.
- Cardiac – This study includes all cardiac measurements.

Naming Format for Cardiac Measurements

When you make a measurement, on the Top/Sub Menu you select the abbreviation for the measurement. Most abbreviations are made using acronyms. The following table lists acronyms used for naming cardiac measurements.

Table 10-1: Cardiology Abbreviations

Acronym	Name
% STIVS	% Interventricular Shortening
A	Area
Acc	Acceleration
AccT	Flow Acceleration Time
ALS	Aortic Leaflet Separation
Ann	Annulus
Ao	Aorta
AR	Aortic Regurg
Asc	Ascending
ASD	Atrial Septal Defect
AV	Aortic Valve
AV Cusp	Aortic Valve Cusp Separation
AVA	Aortic Valve Area
AV-A	Aortic Valve Area by Continuity Equation
BSA	Body Surface Area
CI	Cardiac Index
CO	Cardiac Output
d	Diastolic
D	Diameter
Dec	Deceleration
DecT	Deceleration Time
Desc	Descending
Dur	Duration
EdV	End Diastolic Volume
EF	Ejection Fraction
EPSS	E-Point-to-Septum Separation

Table 10-1: Cardiology Abbreviations

Acronym	Name
EsV	End Systolic Volume
ET	Ejection Time
FS	Fractional Shortening
FV	Flow Volume
FVI	Flow Velocity Integral
HR	Heart Rate
IVRT	IsoVolumetric Relaxation Time
IVS	Interventricular Septum
L	Length
LA	Left Atrium
LAA	Left Atrium Area
LAD	Left Atrium Diameter
LPA	Left Pulmonary Artery
LV	Left Ventricle
LVA	Left Ventricular Area
LVID	Left Ventricle Internal Diameter
LVL	Left Ventricle Length
LVM	Left Ventricular Mass
LVPW	Left Ventricle Posterior Wall
ML	Medial to Lateral
MPA	Main Pulmonary Artery
MR	Mitral Regurgitation
MV	Mitral Valve
MVcf	Mean Velocity Circumferential Fiber Shortening
MVO	Mitral Valve Orifice
OT	Outflow Tract
P	Papillary Muscles
PA	Pulmonary Artery
PAP	Pulmonary Artery Pressure
PDA	Patent Ductus Arterosis

Table 10-1: Cardiology Abbreviations

Acronym	Name
PEP	Pre-Ejection Period
PFO	Patent Foramen Ovale
PG	Pressure Gradient
PHT	Pressure Half Time
PI	Pulmonary Insufficiency
PISA	Proximal Isovelocity Surface Area
PR	Pulmonic Regurgitation
PV	Pulmonic Valve
PV-A	Pulmonic Valve Area by Continuity Equation
PVein	Pulmonary Vein
PW	Posterior Wall
Qp	Pulmonic Flow or CO
Qs	Systemic Flow or CO
RA	Right Atrium
RAA	Right Atrium Area
Rad	Radius
RAD	Right Atrium Diameter
RPA	Right Pulmonary Artery
RV	Right Ventricle
RVA	Right Ventricle Area
RVAW	RIght Ventricle Anterior Wall
RVD	Right Ventricle Diameter
RVID	Right Ventricle Internal Diameter
RVL	Right Ventricle LEngth
RVOT	Right Ventricle Outflow Tract
s	Systolic
SI	Stroke Index
ST	Shortening
SV	Stroke Volume
SVI	Stroke Volume Index

Table 10-1: Cardiology Abbreviations

Acronym	Name
T	Time
TA	Tricuspid Annulus
TAML	Tricuspid Annulus Medial to Lateral
TR	Tricuspid Regurgitation
TV	Tricuspid Valve
TVA	Tricuspid Valve Area
Vcf	Velocity Circumferential Fiber Shortening
Vel	Velocity
VET	Valve Ejection Time
Vmax	Maximum Velocity
Vmean	Mean Velocity
VSD	Ventricular Septal Defect
VTI	Velocity Time Integral

In this manual, the abbreviation for each measurement is listed in parenthesis after the measurement, as follows:

- Aortic Root Diameter (***Ao Root Diam***)
- Left Ventricle Posterior Wall Thickness, Diastolic (***LVPWd***)

For example, to measure the Aortic Root Diameter, you select ***Ao Diam*** on the Top/Sub Menu.

Cardiac Measurements

This section lists cardiac measurements and the steps to perform them. The measurement information in this section is organized by mode, then by region of interest, and then by type of measurement. The organization is as follows:

- Mode; there is a section for B-Mode, M-Mode, Color Flow Mode, and Doppler Mode. There is also a Combination Mode section, which includes calculations that are a result of measurements made in more than one mode.
- Within each mode section, there are sections for region of interest, such as aorta or mitral valve.
- Within each region of interest section, there are sections for type of measurement, such a one distance, two distance, trace, or velocity flow trace. Each measurement type section lists all cardiac measurements that are that type, and then describes the steps to perform that type of measurement.

Some measurements, such as Aortic Root Diameter or Aortic Valve Cusp Separation, can be made in B-Mode or M-Mode. The information for these measurements is included in both B-Mode and M-Mode sections.

NOTE: You can select the diastole frame/systole frame (ED/ES or ES/ED) with the assigned Top/Sub Menu control.

B-Mode Measurements

Aorta

The following are cardiac B-Mode aorta measurements:

One distance measurements

- Aortic Root Diameter (***Ao Diam***)
- Aortic Arch Diameter (***Ao Arch Diam***)
- Ascending Aortic Diameter (***Ao Asc***)
- Descending Aortic Diameter (***Ao Desc Diam***)
- Aorta Isthmus (***Ao Isthmus***)
- Aorta ST Junction (***Ao st junct***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Aortic Valve

The following are cardiac B-Mode aortic valve measurements:

One distance measurements

- Aortic Diameter (***Ao Diam***)
- Aortic Valve Cusp Separation (***AV Cusp***)
- Aortic Valve Diameter (***AV Diam***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

One trace measurements

- Aortic Valve Area Planimetry (***AVA Planimetry***)
- Transverse Aortic Valve Area (***Trans AVA(d), Trans AVA(s)***)

Making a trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the measurement area, move the **Trackball**.

   A line shows the traced area.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Left Atrium

The following are cardiac B-Mode Left Atrium measurements:

Two distance measurements

- Left Atrium Diameter to AoRoot Diameter Ratio (***LA/Ao Ratio***)

Making two distance measurements

1. Select ***LA/Ao Ratio***; an active caliper displays.
2. Make the first distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window. After the first measurement, the system displays an active caliper.
3. To make the second distance measurement, repeat steps a–d above.

   The system displays the measurements and ratio in the Results Window.

Left Atrium (continued)

One distance measurement

- Left Atrium Diameter (***LA Diam***)
- Left Atrium Length (***LA Major***)
- Left Atrium Width (***LA Minor***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Left Atrium (continued)

One trace measurements

- Left Atrium Area
  - Diastolic (***LAA(d)***)
  - Systolic (***LAA(s)***)

Making a trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the measurement area, move the **Trackball**.

   A line shows the traced area.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

One trace measurement and one distance measurement

- Left Atrium Volume, Single Plane, Method of Disk
  - Diastolic (***LAEDV A2C***) (***LAEDV A4C***)
  - Systolic (***LAESV A2C***) (***LAESV A4C***)

Making a trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the measurement area, move the **Trackball**.

   A line shows the traced area.
5. To complete the measurement, press **Set**.
6. To position the active caliper at the end point of the axis, move the **Trackball**.
7. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Left Ventricle

The following are cardiac B-Mode Left Ventricle measurements:

NOTE: *The user can select the Straight/Line (polygonal line) with the LV study tool. Adjust the appropriate Top/Sub Menu control to make the selection.*

One distance measurements

- Left Ventricle Mass
    - Diastolic (***LVPWd***)
    - Systolic (***LVPWs***)
- Left Ventricle Volume, Teichholz
    - Diastolic (***LVIDd***)
    - Systolic (***LVIDs***)
- Left Ventricle Volume, Cubic
    - Diastolic (***LVIDd***)
    - Systolic (***LVIDs***)
- Left Ventricle Internal Diameter
    - Diastolic (***LVIDd***)
    - Systolic (***LVIDs***)
- Left Ventricle Length
    - Diastolic (***LVLd***)
    - Systolic (***LVLs***)
- Left Ventricle Outflow Tract Diameter (***LVOT Diam***)
- Left Ventricle Posterior Wall Thickness
    - Diastolic (***LVPWd***)
    - Systolic (***LVPWs***)
- Left Ventricle Length (***LV Major***)
- Left Ventricle Width (***LV Minor***)

Left Ventricle (continued)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Left Ventricle (continued)

One trace measurements

- Left Ventricle Outflow Tract Area (***LVOT Diam***)
- Left Ventricle Area, Two Chamber
    - Diastolic (***LVA (d)***)
    - Systolic (***LVA (s)***)
- Left Ventricle Area, Four Chamber
    - Diastolic (***LVA (d)***)
    - Systolic (***LVA (s)***)
- Left Ventricle Area, Short Axis
    - Diastolic (***LVA (d)***)
    - Systolic (***LVA (s)***)
- Left Ventricle Endocardial Area, Width (***LVA (d)***)
- Left Ventricle Epicardial Area, Length
    - Diastolic (***LVAepi (d)***)
    - Systolic (***LVAepi (s)***)

Making a trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the measurement area, move the **Trackball**.

   A line shows the traced area.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Left Ventricle (continued)

One time interval measurements

- Heart Rate, Teichholz
- Heart Rate for Two Chamber study
- Heart Rate for Four Chamber study
- Heart Rate for Two Chamber Area-Length study
- Heart Rate for Two Chamber Method of Disk study
- Heart Rate for Four Chamber Area-Length study
- Heart Rate for Four Chamber Method of Disk study
- Heart Rate for Bi-Plane Method of Disk study

Making a time interval measurement

1. Select the measurement.

   The system displays an active caliper and a vertical dotted line.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the time interval in the Results Window.

Left Ventricle (continued)

Body surface area and LV mass measurements

- Left Ventricle Mass Index,
  - Diastolic (***LVPWd***)
  - Systolic (***LVPWs***)

  The system calculates body surface area from the patient's height and weight.

  Left Ventricle Mass is a one distance measurement.

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Two distance measurements

- Ejection Fraction, Teichholz (***LVIDs***)
- Ejection Fraction, Cubic (***LVIDs***)
- Left Ventricle Posterior Wall Fractional Shortening (***LVPWs***)
- Left Ventricle Stroke Index, Teichholz (***LVIDs***, and Body Surface Area)
- Left Ventricle Fractional Shortening (***LVIDs***)
- Left Ventricle Stroke Volume, Teichholz (***LVIDs***)
- Left Ventricle Stroke Volume, Cubic (***LVIDs***)

Left Ventricle (continued)

Body surface area and stroke volume measurements

- Left Ventricle Stroke Index, Single Plane, Two Chamber, Method of Disk (***LVIDd***, ***LVIDs***)
- Left Ventricle Stroke Index, Single Plane, Four Chamber, Method of Disk (***LVIDd***, ***LVIDs***)
- Left Ventricle Stroke Index, Bi-Plane, Bullet
- Left Ventricle Stroke Index, Bi-Plane, Method of Disk (***LVAd***, ***LVAs***)

The system calculates body surface area from the patient's height and weight.

Body surface area and LV Mass

- Left Ventricle Mass Index
  - Diastolic (***LVPWd***)
  - Systolic (***LVPWd***)

The system calculates body surface area from the patient's height and weight.

Left Ventricle Study

- Diastolic (***LVd***)
- Systolic (***LVs***)

The Left Ventricle study automatically sequences the following measurements:

- Interventricular Septum (***IVSd***, ***IVSs***)
- Left Ventricle Internal Diameter (***LVIDs***, ***LVIDd***)
- Left Ventricle Posterior Wall Thickness (***LVPWs***, ***LVPWd***)

Mitral Valve

The following are cardiac B-Mode Mitral Valve measurements:

One distance measurements

- Mitral Valve Annulus Diameter (***MV Ann Diam***)
- E-Point-to-Septum Separation (***EPSS***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

One trace measurement

- Mitral Valve Area by Pressure Half Time (***MVA By PHT***)
- Mitral Valve Area Planimetry (***MVA Planimetry***)

Making a trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the measurement area, move the **Trackball**.

   A line shows the traced area.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Pulmonic Valve

The following are cardiac B-Mode Pulmonic Valve measurements:

One distance measurement

- Pulmonic Valve Annulus Diameter (***PV Ann Diam***)
- Pulmonic Diameter (***Pulmonic Diam***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Right Atrium

The following are cardiac B-Mode Right Atrium measurements:

One distance measurement

- Right Atrium Diameter, Length (***RA Major***)
- Right Atrium Diameter, Width (***RA Minor***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Right Atrium (continued)

One trace measurements

- Right Atrium Area (***RA Area***)
- Right Atrium Volume, SIngle Plane, Method of Disk (***RAAd***)
- Right Atrium Volume, Systolic, SIngle Plane, Method of Disk (***RAAs***)

Making a trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the measurement area, move the **Trackball**.

   A line shows the traced area.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Right Ventricle

The following are cardiac B-Mode Right Ventricle measurements:

One trace measurement

- Left Pulmonary Artery Area (***LPA Area***)
- Right Pulmonary Artery Area (***RPA Area***)

Making a trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the measurement area, move the **Trackball**.

   A line shows the traced area.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Right Ventricle (continued)

One distance measurements

- Right Ventricle Internal Diameter
    - Diastolic (***RVIDd***)
    - Systolic (***RVIDs***)
- Right Ventricle Diameter, Length (***RV Major***)
- Right Ventricle Diameter, Width (***RV Minor***)
- Right Ventricle Wall Thickness
    - Diastolic (***RVAWd***)
    - Systolic (***RVAWs***)
- Right Ventricle Outflow Tract Diameter (***RVOT Diam***)
- Left Pulmonary Artery (***LPA***)
- Main Pulmonary Artery (***MPA***)
- Right Pulmonary Artery (***RPA***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

System

The following are cardiac B-Mode System measurements:

One distance measurements

- Interventricular Septum Thickness
    - Diastolic (***IVSd***)
    - Systolic (***IVSs***)
- Inferior Vena Cava (***IVC***)
- Main Pulmonary Artery Diameter (***MPA Diam***)
- Systemic Vein Diameter (***Systemic Diam***)
- Patent Ductus Arterosis Diameter (***PDA Diam***)
- Patent Foramen Ovale Diameter (***PFO Diam***)
- Pericard Effusion Diastole (***PEd***)
- Ventricular Septal Defect Diameter (***VSD Diam***)
- Atrial Septal Defect Diameter (***ASD Diam***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Body surface area and stroke volume measurements

- Interventricular Septum (IVS) Fractional Shortening (***IVSs***)

  The system calculates body surface area from the patient's height and weight.

Tricuspid Valve

The following are cardiac B-Mode Tricuspid Valve measurements:

One distance measurements

- Tricuspid Valve Annulus Diameter (***TV Ann Diam***)
- Tricuspid Valve Area (***TV Area***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

M-Mode Measurements

Aorta

The following are cardiac M-Mode aorta measurements:

One distance measurement

- Aortic Root Diameter (***Ao Root Diam***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Aortic Valve

The following are cardiac M-Mode aortic valve measurements:

One distance measurements

- Aortic Valve Cusp Separation (***AV Cusp***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Left Atrium

The following are cardiac M-Mode Left Atrium measurements:

One distance measurement

- Left Atrium Diameter (***LA Diam***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Left Atrium (continued)

Two distance measurement (ratio)

- Left Atrium Diameter to AoRoot Diameter Ratio (***LA/Ao***)

Making two distance measurements

1. Select ***LA/Ao***; an active caliper displays.
2. Make the first distance measurement:
    a. To position the active caliper at the start point, move the **Trackball**.
    b. To fix the start point, press **Set**.

       The system fixes the first caliper and displays a second active caliper.
    c. To position the second active caliper at the end point, move the **Trackball**.

       A dotted line connects the measurement points.
    d. To complete the measurement, press **Set**.

       The system displays the distance value in the Results Window. After the first measurement, the system displays an active caliper.
3. To make the second distance measurement, repeat steps a–d above.

   The system displays the measurements and ratio in the Results Window.

Left Ventricle

The following are cardiac M-Mode Left Ventricle measurements:

One distance measurements

- Left Ventricle Volume, Teichholz
  - Diastolic (***LVIDd***)
  - Systolic (***LVIDs***)
- Left Ventricle Volume, Cubic
  - Diastolic (***LVIDd***)
  - Systolic (***LVIDs***)
- Left Ventricle Internal Diameter
  - Diastolic (***LVIDd***)
  - Systolic (***LVIDs***)
- Left Ventricle Posterior Wall Thickness
  - Diastolic (***LVPWd***)
  - Systolic (***LVPWs***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Left Ventricle (continued)

One time interval measurement

- Heart Rate, Teichholz
- Left Ventricle Ejection Time (***LVET***)
- Left Ventricle Pre-Ejection Period (***LVPEP***)
- Velocity Circumferential Fiber Shortening (***Vcf***)

Making a time interval measurement

1. Select the measurement.

   The system displays an active caliper and a vertical dotted line.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the time interval in the Results Window.

Left Ventricle Study

The Left Ventricle study (***LV Study***) automatically sequences the following measurements:

- Interventricular Septum (***IVSd, IVSs***)
- Left Ventricle Internal Diameter (***LVIDd, LVIDs***)
- Left Ventricle Posterior Wall Thickness (***LVPWd, LVPWs***)

Mitral Valve

The following are cardiac M-Mode Mitral Valve measurements.

One distance measurements

- E-Point-to-Septum Separation (***EPSS***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Mitral Valve (continued)

One slope measurements

- Mitral Valve Anterior Leaflet Excursion (***D-E Excursion***)
- Mitral Valve D-E Slope (***D-E Slope***)
- Mitral Valve E-F Slope (***E-F Slope***)

Making a slope measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the **Trackball**.

   A dotted line shows the slope.
5. To complete the measurement, press **Set**.

   The system displays the slope measurement in the Results Window.

Right Ventricle

The following are cardiac M-Mode Right Ventricle measurements:

One distance measurements

- Right Ventricle Internal Diameter
  - Diastolic (***RVIDd***)
  - Systolic (***RVIDs***)
- Right Ventricle Wall Thickness
  - Diastolic (***RVAWd***)
  - Systolic (***RVAWs***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Right Ventricle (continued)

One time interval measurements

- Right Ventricle Ejection Time (***RVET***)
- Right Ventricle Pre-Ejection Period (***RVPEP***)

Making a time interval measurement

1. Select the measurement.

   The system displays an active caliper and a vertical dotted line.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the time interval in the Results Window.

Right Ventricle Study

The Right Ventricle study (***RV study***) automatically sequences the following measurements:

- Right Ventricle Internal Diameter (RVIDd, RVIDs))

Pulmonic Valve

The following are cardiac M-Mode Pulmonic Valve measurements:

One time interval measurements

- QRS complex to end of envelope (***Q-to-PV close***)

Making a time interval measurement

1. Select the measurement.

   The system displays an active caliper and a vertical dotted line.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the time interval in the Results Window.

System

The following are cardiac M-Mode System measurements.

One distance measurements

- Interventricular Septum
  - Diastolic (***IVSd***)
  - Systolic (***IVSs***)
- Pericard Effusion (***PEd***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Two distance measurement:

- Interventricular Septum (IVS) Fractional Shortening (***LVD - LVS / LVD x 100***)

Tricuspid Valve

The following are cardiac M-Mode Tricuspid Valve measurements:

One time interval measurements

- QRS complex to end of envelope (***Q-to-TV close***)

Making a time interval measurement

1. Select the measurement.

   The system displays an active caliper and a vertical dotted line.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the time interval in the Results Window.

Doppler Mode Measurements

Aortic Valve

The following are cardiac Doppler Mode aortic valve measurements:

Velocity flow trace measurements

- Aortic Insufficiency Mean Pressure Gradient (***AI Trace***)
- Aortic Insufficiency Peak Pressure Gradient (***AI Vmax***)
- Aortic Insufficiency Mean Velocity (***AI Trace***)
- Aortic Insufficiency Mean Square Root Velocity (***AI Trace***)
- Aortic Insufficiency Velocity Time Integral (***AI Trace***)
- Aortic Valve Mean Velocity (***AV Trace***)
- Aortic Valve Mean Square Root Velocity (***AV Trace***)
- Aortic Valve Velocity Time Integral (***AV Trace***)
- Aortic Valve Mean Pressure Gradient (***AV Trace***)

Making a velocity flow trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the envelope, move the **Trackball**.

   A line shows the traced area.
5. To complete the trace, press **Set**.

   The system displays a second vertical dotted line.
6. To position the second dotted line at the start of the next envelope, move the **Trackball**.
7. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Aortic Valve (continued)

One peak velocity measurements

- Aortic Valve Peak Pressure Gradient (***AR Vmax***)
- Aortic Insufficiency Peak Velocity (***AR Vmax/AI Vmax***)
- Aortic Insufficiency End-Diastolic Velocity (***ARend Vmax/ AIend Vmax***)
- Aortic Valve Peak Velocity (***AV Vmax***)
- Aortic Valve Peak Velocity at Point E (***AV Vmax***)
- Aorta Proximal Coarctation (***Coarc Pre-Duct***)
- Aorta Distal Coarctation (***Coarc Post-Duct***)

Making a peak velocity measurement

1. Select the measurement; an active caliper with a vertical dotted line displays.
2. To position the caliper at the desired measurement point, move the **Trackball**.
3. To complete the measurement, press **Set**.

   The system displays the velocity measurement in the Results Window.

Aortic Valve (continued)

One slope measurements

- Aortic Valve Insufficiency Pressure Half Time (***AR PHT***)
- Aortic Valve Flow Acceleration (***AV Trace***)
- Aortic Valve Pressure Half Time (***AV Trace***)

Making a slope measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the **Trackball**.

   A dotted line shows the slope.
5. To complete the measurement, press **Set**.

   The system displays the slope measurement in the Results Window.

Aortic Valve (continued)

One time interval measurements

- Aortic Valve Acceleration Time (***AV AccT***)
- Aortic Valve Deceleration TIme (***AI PHT***)
- Aortic Valve Ejection Time (***AVET***)
- Aortic Valve Heart Rate
- Time

Making a time interval measurement

1. Select the measurement.

   The system displays an active caliper and a vertical dotted line.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the time interval in the Results Window.

Two time interval measurement

Slope through aortic valve trace:

- Aortic Valve Acceleration to Ejection Time Ratio (***AVET***)
- Aortic Valve Area according to PHT

Left Ventricle

The following are cardiac Doppler Mode Left Ventricle measurements:

One peak velocity measurements

- Left Ventricle Outflow Tract Peak Pressure Gradient (***LVOT maxPG***)
- Left Ventricle Outflow Tract Peak Velocity (***LVOT Vmax***)

Making a peak velocity measurement

1. Select the measurement; an active caliper with a vertical dotted line displays.
2. To position the caliper at the desired measurement point, move the **Trackball**.
3. To complete the measurement, press **Set**.

   The system displays the velocity measurement in the Results Window.

Left Ventricle (continued)

One velocity flow trace measurements

- Left Ventricle Outflow Tract Mean Pressure Gradient (***LVOT Trace***)
- Left Ventricle Outflow Tract Mean Velocity (***LVOT Trace***)
- Left Ventricle Outflow Tract Mean Square Root Velocity (***LVOT Trace***)
- Left Ventricle Outflow Tract Velocity Time Integral (***LVOT Trace***)

Making a velocity flow trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the envelope, move the **Trackball**.

   A line shows the traced area.
5. To complete the trace, press **Set**.

   The system displays a second vertical dotted line.
6. To position the second dotted line at the start of the next envelope, move the **Trackball**.
7. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Left Ventricle (continued)

One time interval measurements

- Left Ventricle Heart Rate (***LVOT Trace***)
- Left Ventricle Ejection Time (***LVET***)

Making a time interval measurement

1. Select the measurement.

   The system displays an active caliper and a vertical dotted line.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the time interval in the Results Window.

One velocity flow trace and one time interval measurement:

- Cardiac Output by Aortic Flow (***AVA Planimetry***, ***AV Trace***)

Body surface area and stroke volume measurement:

- Stroke Volume Index by Aortic Flow (***AVA Planimetry***, ***AV Trace***)

  The system calculates body surface area from the patient's height and weight.

Mitral Valve

The following are cardiac Doppler Mode Mitral Valve measurements:

NOTE: *When measuring the MV E/A velocity, Auto/Manual trace can be modified with the appropriate Top/Sub Menu control.*

One velocity flow trace measurements

- Mitral Valve Regurgitant Flow Acceleration (***MV Trace***)
- Mitral Valve Regurgitant Mean Velocity (***MV Trace***)
- Mitral Regurgitant Mean Square Root Velocity (***MR Trace***)
- Mitral Regurgitant Mean Pressure Gradient (***MR Trace***)
- Mitral Regurgitant Velocity Time Integral (***MR Trace***)
- Mitral Valve Mean Velocity (***MV Trace***)
- Mitral Valve Mean Square Root Velocity (***MV Trace***)
- Mitral Valve Velocity Time Integral (***MV Trace***)
- Mitral Valve Mean Pressure Gradient (***MV Trace***)

Making a velocity flow trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the envelope, move the **Trackball**.

   A line shows the traced area.
5. To complete the trace, press **Set**.

   The system displays a second vertical dotted line.
6. To position the second dotted line at the start of the next envelope, move the **Trackball**.
7. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Mitral Valve (continued)

One peak velocity measurements

- Mitral Regurgitant Peak Pressure Gradient (***MR Vmax***)
- Mitral Valve Peak Pressure Gradient (***MV Vmax***)
- Mitral Regurgitant Peak Velocity (***MR Vmax***)
- Mitral Valve Peak Velocity (***MV Vmax***)
- Mitral Valve Velocity Peak A (***MV A Velocity***)
- Mitral Valve Velocity Peak E (***MV E Velocity***)

Making a peak velocity measurement

1. Select the measurement; an active caliper with a vertical dotted line displays.
2. To position the caliper at the desired measurement point, move the **Trackball**.
3. To complete the measurement, press **Set**.

   The system displays the velocity measurement in the Results Window.

Mitral Valve (continued)

One slope measurements

- Mitral Valve Area according to PHT (***MV PHT***)
- Mitral Valve Flow Deceleration (***MV DecT***)
- Mitral Valve Pressure Half Time (***MV PHT***)
- Mitral Valve Flow Acceleration (***MV AccT***)

Making a slope measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the **Trackball**.

   A dotted line shows the slope.
5. To complete the measurement, press **Set**.

   The system displays the slope measurement in the Results Window.

Mitral Valve (continued)

Two distance measurement

- Mitral Valve E-Peak to A-Peak Ratio (A-C and D-E) (***MV E/A Ratio***)

Making a two distance measurement

1. Select ***MV E/A Ratio***; an active caliper displays.
2. Make the first distance measurement:
   a. To position the active caliper at the start point, move the **Trackball**.
   b. To fix the start point, press **Set**.

      The system fixes the first caliper and displays a second active caliper.
   c. To position the second active caliper at the end point, move the **Trackball**.

      A dotted line connects the measurement points.
   d. To complete the measurement, press **Set**.

      The system displays the distance value in the Results Window. After the first measurement, the system displays an active caliper.
3. To make the second distance measurement, repeat steps a–d above.

   The system displays the measurements and ratio in the Results Window.

Mitral Valve (continued)

One time interval/ slope measurements

- Mitral Valve Acceleration Time (***MV AccT***)
- Mitral Valve Deceleration Time (***MV DecT***)

Making a time interval/slope measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the **Trackball**.

   A dotted line shows the slope.
5. To complete the measurement, press **Set**.

   The system displays the time interval and slope measurements in the Results Window.

Mitral Valve (continued)

One time interval measurements

- Mitral Valve Ejection Time ((***MV Trace***)
- Mitral Valve A-Wave Duration (***MV A Dur***)
- Mitral Valve Time to Peak (***MV Trace***)
- Time

Making a time interval measurement

1. Select the measurement.

   The system displays an active caliper and a vertical dotted line.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the time interval in the Results Window.

Two time interval measurement

Body surface area and stroke volume measurements:

- Stroke Volume Index by Mitral Flow (***MV Trace***)

  The system calculates body surface area from the patient's height and weight.

One distance and two velocity measurement:

- Mitral Valve Area from Continuity Equation (***MV Vmax***)

Pulmonic Valve

The following are cardiac Doppler Mode Pulmonic Valve measurements:

One peak velocity measurements

- Pulmonic Insufficiency Peak Pressure Gradient (***PI Vmax***)
- Pulmonic Insufficiency End-Diastolic Pressure Gradient (***PR Trace***)
- Pulmonic Valve Peak Pressure Gradient (***PV Vmax***)
- Pulmonic End-Diastolic Pressure Gradient (***PR Trace***)
- Pulmonic Insufficiency Peak Velocity (***PR Vmax***)
- Pulmonic Insufficiency End-Diastolic Velocity (***PRend Vmax***)
- Pulmonic Valve Peak Velocity (***PV Vmax***)
- Pulmonic End-Diastolic Velocity (***PV Trace***)

Making a peak velocity measurement

1. Select the measurement; an active caliper with a vertical dotted line displays.
2. To position the caliper at the desired measurement point, move the **Trackball**.
3. To complete the measurement, press **Set**.

   The system displays the velocity measurement in the Results Window.

Pulmonic Valve (continued)

One velocity flow trace measurements

- Pulmonary Artery Diastolic Pressure (***PV Trace***)
- Pulmonic Insufficiency Mean Pressure Gradient (***PR Trace***)
- Pulmonic Valve Mean Pressure Gradient (***PV Trace***)
- Pulmonic Insufficiency Mean Velocity (***PR Trace***)
- Pulmonic Insufficiency Mean Square Root Velocity(***PR Trace***)
- Pulmonic Insufficiency Velocity Time Integral (***PR Trace***)
- Pulmonic Valve Mean Velocity (***PV Trace***)
- Pulmonic Valve Mean Square Root Velocity (***PV Trace***)
- Pulmonic Valve Velocity Time Integral (***PV Trace***)

Making a velocity flow trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the envelope, move the **Trackball**.

   A line shows the traced area.
5. To complete the trace, press **Set**.

   The system displays a second vertical dotted line.
6. To position the second dotted line at the start of the next envelope, move the **Trackball**.
7. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Pulmonic Valve (continued)

One slope measurements

- Pulmonic Insufficiency Pressure Half Time (***PR PHT***)
- Pulmonic Valve Flow Acceleration (***PV AccT***)

Making a slope measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the **Trackball**.

   A dotted line shows the slope.
5. To complete the measurement, press **Set**.

   The system displays the slope measurement in the Results Window.

One time interval measurements

- Pulmonic Valve Acceleration Time (***PV AccT***)
- Pulmonic Valve Ejection Time (***PVET***)
- Pulmonic Valve Pre-Ejection Period (***PVPEP***)
- QRS complex to end of envelope (***Q-to-PV close***)
- Time

Pulmonic Valve (continued)

Making a time interval measurement

1. Select the measurement.

   The system displays an active caliper and a vertical dotted line.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the time interval in the Results Window.

Two time intervals measurements

- Pulmonic Valve Acceleration to Ejection TIme Ratio (***PV AccT***, ***PVET***)
- Pulmonic Valve Pre-Ejection to Ejection Time Ratio (***PVPEP***, ***PVET***)

Right Ventricle

The following are cardiac Doppler Mode Right Ventricle measurements:

One peak velocity measurements

- Right Ventricle Outflow Tract Peak Pressure Gradient (***RVOT Vmax***)
- Right Ventricle Systolic Pressure (***RVOT Vmax***)
- Right Ventricle Outflow Tract Peak Velocity (***RVOT Vmax***)

Making a peak velocity measurement

1. Select the measurement; an active caliper with a vertical dotted line displays.
2. To position the caliper at the desired measurement point, move the **Trackball**.
3. To complete the measurement, press **Set**.

   The system displays the velocity measurement in the Results Window.

One velocity flow trace measurement

- Right Ventricle Diastolic Pressure (***RVOT Trace***)
- Right Ventricle Outflow Tract Velocity Time Integral (***RVOT Trace***)

Right Ventricle (continued)

Making a velocity flow trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the envelope, move the **Trackball**.

   A line shows the traced area.
5. To complete the trace, press **Set**.

   The system displays a second vertical dotted line.
6. To position the second dotted line at the start of the next envelope, move the **Trackball**.
7. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

One time interval measurement

- Right Ventricle Ejection Time (***PV Trace***)

Right Ventricle (continued)

Making a time interval measurement

1. Select the measurement.

   The system displays an active caliper and a vertical dotted line.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the time interval in the Results Window.

One velocity flow trace and one area measurements:

- Stroke Volume by Pulmonic Flow (***RVOT Trace***)

Body surface area and stroke volume measurements:

- Right Ventricle Stroke Volume Index by Pulmonic Flow (***RVOT Trace***)

  The system calculates body surface area from the patient's height and weight.

System

The following are cardiac Doppler Mode System measurements:

One peak velocity measurements

- Pulmonary Artery Peak Velocity (***PV Vmax***)
- Pulmonary Vein Velocity Peak A (reverse) (***P Vein A***)
- Pulmonary Vein Peak Velocity
  - End-Diastolic (***P Vein D***)
  - Systolic (***P Vein S***)
- Systemic Vein Peak Velocity
  - End-Diastolic (***PDA Diastolic***)
  - Systolic (***PDA Systolic***)
- Ventricular Septal Defect Peak Velocity (***VSD Vmax***)
- Atrial Septal Defect Peak Velocity (***ASD Vmax***)

Making a peak velocity measurement

1. Select the measurement; an active caliper with a vertical dotted line displays.
2. To position the caliper at the desired measurement point, move the **Trackball**.
3. To complete the measurement, press **Set**.

   The system displays the velocity measurement in the Results Window.

System (continued)

One velocity flow trace measurements

- Pulmonary Artery Velocity Time Integral (***Pulmonic VTI***)
- Systemic Vein Velocity Time Integral (***Systemic VTI***)

Making a velocity flow trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the envelope, move the **Trackball**.

   A line shows the traced area.
5. To complete the trace, press **Set**.

   The system displays a second vertical dotted line.
6. To position the second dotted line at the start of the next envelope, move the **Trackball**.
7. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

One time interval measurements

- Pulmonary Vein A-Wave Duration (***P Vein A Dur***)
- Time
- IsoVolumetric Relaxation Time (***IVRT***)
- IsoVolumetric Contraction Time (***IVCT***)

System (continued)

Making a time interval measurement

1. Select the measurement.

   The system displays an active caliper and a vertical dotted line.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the time interval in the Results Window.

Two peak velocity measurements

- Pulmonary Vein S/D Ratio (***P Vein D, P Vein S***)
- Ventricular Septal Defect Peak Pressure Gradient (***VSD Vmax***)

Two velocity flow trace measurements:

- Pulmonic-to-Systemic Flow Ratio (***Qp/Qs***)

Tricuspid Valve

The following are cardiac Doppler Mode Tricuspid Valve measurements:

One peak velocity measurements

- Tricuspid Regurgitant Peak Pressure Gradient (***TR Vmax***)
- Tricuspid Valve Peak Pressure Gradient (***TV Vmax***)
- Tricuspid Regurgitant Peak Velocity (***TR Vmax***)
- Tricuspid Valve Peak Velocity (***TV Vmax***)
- Tricuspid Valve Velocity Peak A (***TV A Velocity***)
- Tricuspid Valve Velocity Peak E (***TV E Velocity***)

Making a peak velocity measurement

1. Select the measurement; an active caliper with a vertical dotted line displays.
2. To position the caliper at the desired measurement point, move the **Trackball**.
3. To complete the measurement, press **Set**.

   The system displays the velocity measurement in the Results Window.

Tricuspid Valve (continued)

One velocity flow trace measurements

- Tricuspid Regurgitant Mean Pressure Gradient (***TR Trace***)
- Tricuspid Regurgitant Mean Velocity (***TR Trace***)
- Tricuspid Regurgitant Mean Square Root Velocity (***TR Trace***)
- Tricuspid Regurgitant Velocity Time Integral (***TR Trace***)
- Tricuspid Valve Mean Pressure Gradient (***TV Trace***)
- Tricuspid Valve Mean Velocity (***TV Trace***)
- Tricuspid Valve Mean Square Root Velocity (***TV Trace***)
- Tricuspid Valve Velocity Time Integral (***TV Trace***)

Making a velocity flow trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the envelope, move the **Trackball**.

   A line shows the traced area.
5. To complete the trace, press **Set**.

   The system displays a second vertical dotted line.
6. To position the second dotted line at the start of the next envelope, move the **Trackball**.
7. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Tricuspid Valve (continued)

One time interval measurements

- Tricuspid Valve Time to Peak (***TV TTP***)
- Tricuspid Valve Closure to Opening (***TCO***)
- Tricuspid Valve A-Wave Duration (***TV A Dur***)
- QRS complex to end of envelope (***Q-to-TV close***)

Making a time interval measurement

1. Select the measurement.

   The system displays an active caliper and a vertical dotted line.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the time interval in the Results Window.

One slope measurements

- Tricuspid Valve Pressure Half Time (***TV PHT***)

Making a slope measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the **Trackball**.

   A dotted line shows the slope.
5. To complete the measurement, press **Set**.

   The system displays the slope measurement in the Results Window.

Tricuspid Valve (continued)

One velocity flow trace and one area measurement	• Stroke Volume by Tricuspid Flow (***TV Trace***)
Two peak velocity measurement	• Tricuspid Valve E-Peak to A-Peak Ratio (***TV E/A Velocity***)

Color Flow Mode

Aortic Valve

The following are cardiac Color Flow Mode Aortic Valve measurements:

One distance measurements

- Proximal Isovelocity Surface Area: Regurgitant Orifice Area (***PISA AR***)
- Proximal Isovelocity Surface Area: Radius of Aliased Point (***PISA AR***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

Aortic Valve (continued)

One velocity flow trace measurements

- Proximal Isovelocity Surface Area: Regurgitant Flow (***PISA AR***)
- Proximal Isovelocity Surface Area: Regurgitant Volume Flow (***PISA AR***)

Making a velocity flow trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the envelope, move the **Trackball**.

   A line shows the traced area.
5. To complete the trace, press **Set**.

   The system displays a second vertical dotted line.
6. To position the second dotted line at the start of the next envelope, move the **Trackball**.
7. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

One peak velocity measurement

- Proximal Isovelocity Surface Area: Aliased Velocity (***PISA AR***)

Making a peak velocity measurement

1. Select the measurement; an active caliper with a vertical dotted line displays.
2. To position the caliper at the desired measurement point, move the **Trackball**.
3. To complete the measurement, press **Set**.

   The system displays the velocity measurement in the Results Window.

Mitral Valve

The following are cardiac Color Flow Mode Mitral Valve measurements:

One distance measurements

- Proximal Isovelocity Surface Area: Regurgitant Orifice Area (***PISA MR***)
- Proximal Isovelocity Surface Area: Radius of Aliased Point (***PISA MR***)

Making a one distance measurement

1. Select the measurement; an active caliper displays.
2. To position the active caliper at the start point, move the **Trackball**.
3. To fix the start point, press **Set**.

   The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the **Trackball**.

   A dotted line connects the measurement points.
5. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

One velocity flow trace measurements

- Proximal Isovelocity Surface Area: Regurgitant Flow (***PISA MR***)

Mitral Valve (continued)

Making a velocity flow trace measurement

1. Select the measurement; an active caliper displays.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the trace start point, press **Set**.

   The system displays a vertical dotted line.
4. To trace the envelope, move the **Trackball**.

   A line shows the traced area.
5. To complete the trace, press **Set**.

   The system displays a second vertical dotted line.
6. To position the second dotted line at the start of the next envelope, move the **Trackball**.
7. To complete the measurement, press **Set**.

   The system displays the measurement in the Results Window.

One peak velocity measurement

- Proximal Isovelocity Surface Area: Aliased Velocity (***PISA MR***)

Making a peak velocity measurement

1. Select the measurement; an active caliper with a vertical dotted line displays.
2. To position the caliper at the desired measurement point, move the **Trackball**.
3. To complete the measurement, press **Set**.

   The system displays the velocity measurement in the Results Window.

Combination Mode Measurements

Some cardiac calculations, such as Aortic Valve Area and Left Ventricle Stroke Volume, require you to make measurements in more than one mode. This section includes those measurements, organized by the region of interest. You can find the descriptions of how to perform these measurements elsewhere in this chapter.

Aortic Valve

One distance and two peak velocity measurement

- Aortic Valve Area (***Ao Diam***, ***LVOT Vmax***, ***AV Vmax***)
- Aortic Valve Area by Continuity Equation by Peak Velocity (***Ao Diam***, ***LVOT Vmax***, ***AV Vmax***)

Velocity flow trace and one trace measurement

- Stroke Volume by Aortic Flow (***AVA Planimetry***, ***AV Trace***)

Velocity flow trace, one trace, and one time interval measurement

- Cardiac Output by Aortic Flow (***AVA Planimetry***, ***AV Trace***, ***HR***)

Two velocity flow trace and one distance measurement:

- Aortic Valve Area by Continuity Equation VTI (***Ao Diam***, ***LVOT Vmax***, ***AV Trace***)

Left Ventricle

Two distance measurements and heart rate

- Cardiac Output, Teichholz (***LVIDd***, ***LVIDs***, ***HR***)
- Cardiac Output, Cubic (***LVIDd***, ***LVIDs***, ***HR***)

Two distance, two trace measurements, and heart rate

- Cardiac Output Two Chamber, Single Plane, Area-Length (***LVAd***, ***LVAs***, ***HR***)
- Cardiac Output Two Chamber, Single Plane, Method of Disk(Simpson) (***LVAd***, ***LVAs***, ***HR***)
- Cardiac Output Four Chamber, Single Plane, Area-Length (***LVAd***, ***LVAs***, ***HR***)
- Cardiac Output Four Chamber, Single Plane, Method of Disk(Simpson) (***LVAd***, ***LVAs***, ***HR***)

Two distance and two trace measurements

- Ejection Fraction, Two Chamber, Single Plane, Area-Length (***LVAd***, ***LVAs***)
- Ejection Fraction, Two Chamber, Single Plane, Method of Disk(Simpson) (***LVAd***, ***LVAs***)
- Ejection Fraction, Four Chamber, Single Plane, Area-Length (***LVAd***, ***LVAs***)
- Ejection Fraction, Four Chamber, Single Plane, Method of Disk(Simpson) (***LVAd***, ***LVAs***)
- Left Ventricle Stroke Volume, Single Plane, Two Chamber, Area-Length (***LVAd***, ***LVAs***)
- Left Ventricle Stroke Volume, Single Plane, Two Chamber, Method of Disk(Simpson) (***LVIDd***, ***LVIDs***, ***LVAd***, ***LVAs***)
- Left Ventricle Stroke Volume, Single Plane, Four Chamber, Area-Length (***LVAd***, ***LVAs***)
- Left Ventricle Stroke Volume, Single Plane, Four Chamber, Method of Disk(Simpson) (***LVIDd***, ***LVIDs***, ***LVAd***, ***LVAs***)
- Left Ventricle Volume, Two Chamber, Area-Length
  - Diastolic (***LVAd***)
  - Systolic (***LVAs***)
- Left Ventricle Volume, Four Chamber, Area-Length
  - Diastolic (***LVAd***)
  - Systolic (***LVAs***)

Left Ventricle (continued)

Four distance and four trace measurements

- Ejection Fraction, Bi-Plane, Method of Disk (***LVAd***, ***LVAs***, 2CH, 4CH)
- Left Ventricle Stroke Volume, Bi-Plane, Method of Disk (***LVAd***, ***LVAs***, 2CH, 4CH)
- Left Ventricle Volume, Bi-Plane, Method of Disk
  - Diastolic (***LVAd***, 2CH, 4CH)
  - Systolic (***LVAs***, 2CH, 4CH)

One distance and one trace measurements

- Left Ventricle Stroke Index, Single Plane, Two Chamber, Area-Length (***LVSd***, ***LVSs***, and Body Surface Area)
- Left Ventricle Stroke Index, Single Plane, Four Chamber, Area-Length (***LVSd***, ***LVSs***, and Body Surface Area)
- Left Ventricle Volume, Single Plane, Four Chamber, Method of Disk
  - Diastolic (***LVAd***)
  - Systolic (***LVAs***)
- Left Ventricle Volume, Single Plane, Two Chamber, Method of Disk
  - Diastolic (***LVAd***)
  - Systolic (***LVAs***)
- Left Ventricle Volume, Apical View, Long Axis, Method of Disk
  - Diastolic (***LVAd***)
  - Systolic (***LVAs***)

One velocity flow trace and one distance measurement

- Stroke Volume by Aortic Flow (***AVA Planimetry***, ***AV Trace***)

Mitral Valve

One velocity flow trace and one trace measurements	• Stroke Volume by Mitral Flow (***MVA Planimetry***, ***MV Trace***)
One velocity flow trace, one trace, and one time interval measurements	• Cardiac Output by Mitral Flow (***MVA Planimetry***, ***MV Trace***, ***HR***)

Pulmonic Valve

One velocity flow trace and one trace measurement	• Stroke Volume by Pulmonic Flow (***PV Planimetry***, ***PV Trace***)
One velocity flow trace, one trace, and one time interval measurement	• Cardiac Output by Pulmonic Flow (***PV Planimetry***, ***PV Trace***, ***HR***)

Right Ventricle

One velocity flow trace, one area, and one time interval measurements	• Cardiac Output by Pulmonic Flow (***RV Planimetry***, ***RV Trace***, ***HR***)

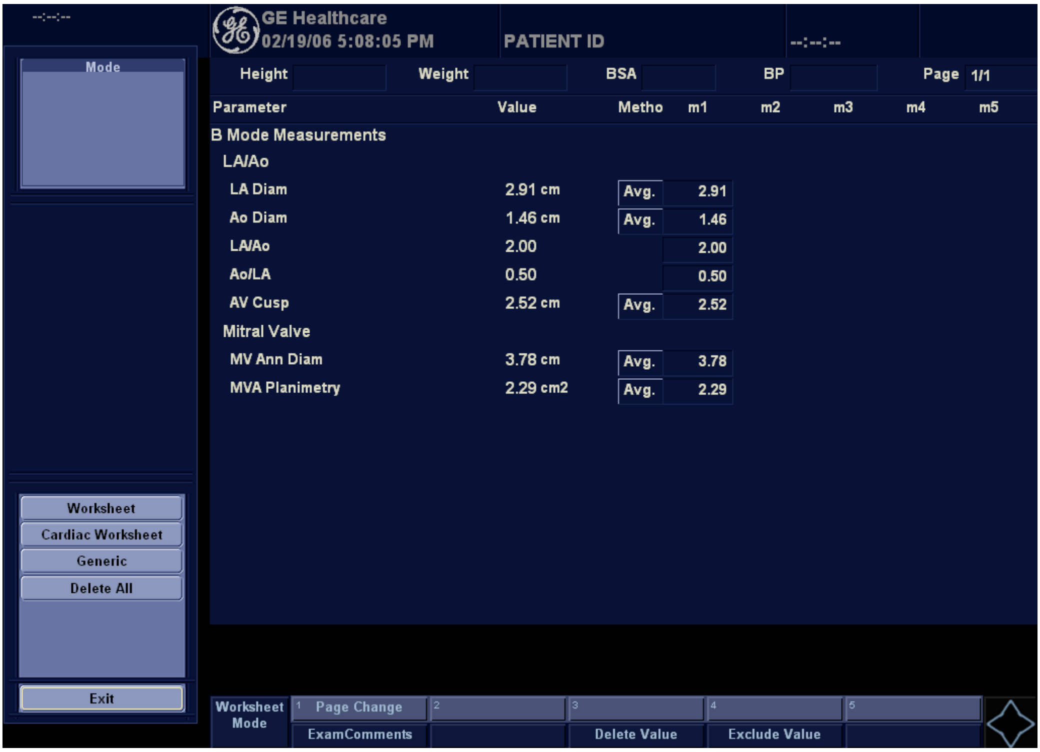
Tricuspid Valve

One velocity flow trace, one area, and one time interval measurement	• Cardiac Output by Tricuspid Flow (***TV Planimetry***, ***TV Trace***, ***HR***)

Cardiac Worksheet

After you make cardiac measurements, you can review all the data on the cardiac worksheet. To view the worksheet, select the ***Worksheet Display*** key on the Top/Sub Menu. See Figure 10-1.

The cardiac worksheet has a heading for each mode, and for each folder. In Figure 10-1, the mode heading is 2D Measurements, followed by Cube/Teichholz. Each measurement from that folder is listed next. It can list up to six values for each measurement. The next folder is then listed, in this example, RV/LV.



GE Healthcare
02/19/06 5:08:05 PM
PATIENT ID

Height | Weight | BSA | BP | Page 1/1

Parameter	Value	Metho	m1	m2	m3	m4	m5
B Mode Measurements							
LA/Ao							
LA Diam	2.91 cm	Avg.	2.91				
Ao Diam	1.46 cm	Avg.	1.46				
LA/Ao	2.00		2.00				
Ao/LA	0.50		0.50				
AV Cusp	2.52 cm	Avg.	2.52				
Mitral Valve							
MV Ann Diam	3.78 cm	Avg.	3.78				
MVA Planimetry	2.29 cm2	Avg.	2.29				

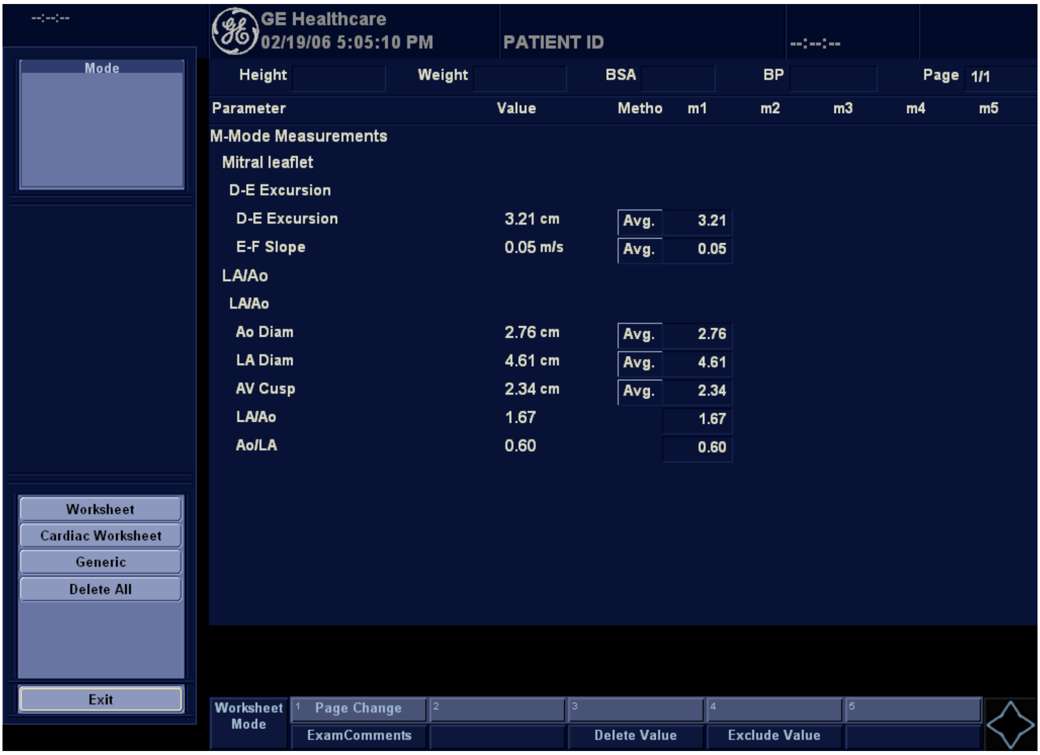
--:--:--
Mode
Worksheet
Cardiac Worksheet
Generic
Delete All
Exit
Worksheet Mode
1 Page Change
ExamComments
2
3
Delete Value
4
Exclude Value
5

Figure 10-1. Cardiac Worksheet: Page 1

Cardiac Worksheet (continued)

If a worksheet has more data on a second page, to view the next page, select **Page Change**. To see page 2 and 3 of this report, see Figure 10-2 and Figure 10-3.

To return to scanning, select the ***Worksheet Display*** key or press ***Esc***.


--:--:--
Mode
Worksheet
Cardiac Worksheet
Generic
Delete All
Exit
Worksheet Mode
1 Page Change
2
3
4
5
ExamComments
Delete Value
Exclude Value

GE Healthcare
02/19/06 5:05:10 PM
PATIENT ID
--:--:--

Height Weight BSA BP Page 1/1

Parameter	Value	Metho	m1	m2	m3	m4	m5
M-Mode Measurements							
Mitral leaflet							
D-E Excursion							
D-E Excursion	3.21 cm	Avg.	3.21				
E-F Slope	0.05 m/s	Avg.	0.05				
LA/Ao							
LA/Ao							
Ao Diam	2.76 cm	Avg.	2.76				
LA Diam	4.61 cm	Avg.	4.61				
AV Cusp	2.34 cm	Avg.	2.34				
LA/Ao	1.67		1.67				
Ao/LA	0.60		0.60				

Figure 10-2. Cardiac Worksheet: Page 2

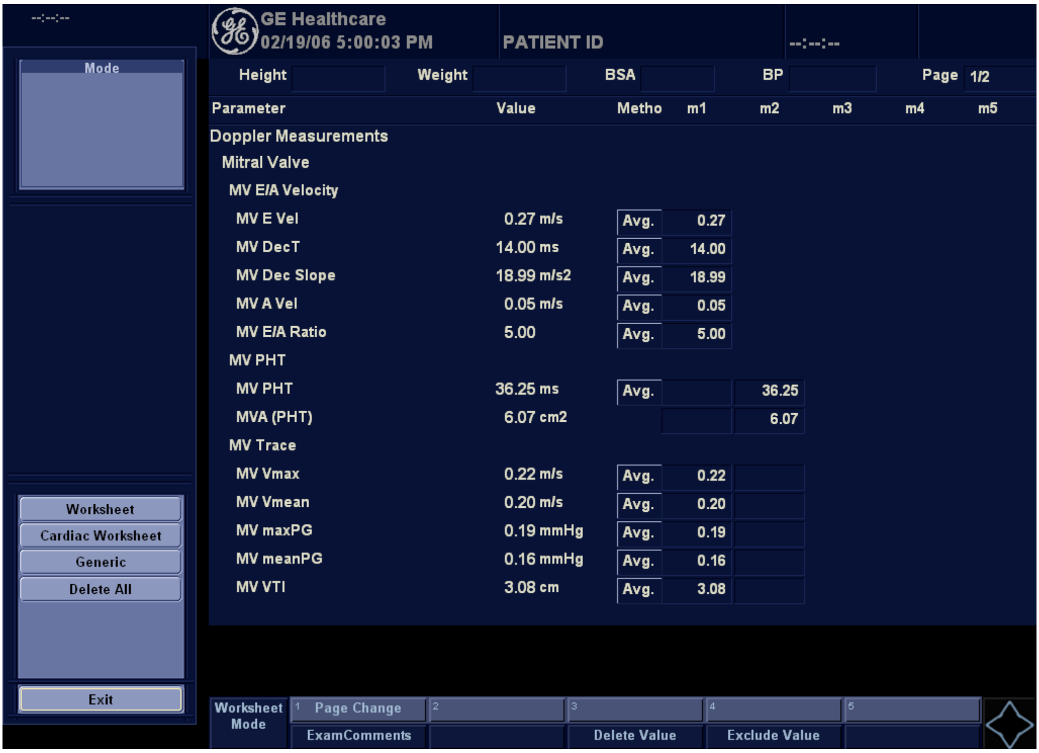
Worksheet information

The information on the cardiac worksheet is as follows:

- Parameter – This column lists the mode, the measurement folder, and the specific measurement.
- Value – The measured value. If more than one measurement was made for an item, the system uses the specified method (average, maximum, minimum, or last) to determine this value.
- m1–m6 – Up to six measurement values for each item. If you make more than six measurements, the worksheet uses the last six.
- Method – When there is more than one measurement for an item, this specifies the method used to calculate the measurement value listed in the Value column. Choices are average, maximum, minimum, or last. To change the method:
  a. Move the **Trackball** to the Method field.
  b. Press **Set**.
  c. Move the **Trackball** to select from the list.
  d. Press **Set**.

For more information about working with worksheets, See 'Viewing and Editing Worksheets' on *page 7-61 for more information.*

Cardiac Worksheet (continued)


--:--:--
GE Healthcare
Mode
Worksheet
Cardiac Worksheet
Generic
Delete All
Exit
Worksheet Mode
1 Page Change
ExamComments
2
3
Delete Value
4
Exclude Value
5

02/19/06 5:00:03 PM

PATIENT ID

--:--:--

Height

Weight

BSA

BP

Page 1/2

Parameter	Value	Metho	m1	m2	m3	m4	m5
Doppler Measurements							
Mitral Valve							
MV E/A Velocity							
MV E Vel	0.27 m/s	Avg.	0.27				
MV DecT	14.00 ms	Avg.	14.00				
MV Dec Slope	18.99 m/s2	Avg.	18.99				
MV A Vel	0.05 m/s	Avg.	0.05				
MV E/A Ratio	5.00	Avg.	5.00				
MV PHT							
MV PHT	36.25 ms	Avg.		36.25			
MVA (PHT)	6.07 cm2			6.07			
MV Trace							
MV Vmax	0.22 m/s	Avg.	0.22				
MV Vmean	0.20 m/s	Avg.	0.20				
MV maxPG	0.19 mmHg	Avg.	0.19				
MV meanPG	0.16 mmHg	Avg.	0.16				
MV VTI	3.08 cm	Avg.	3.08				

Figure 10-3. Cardiac Worksheet: Page 3

Setting up and Organizing Measurements and Calculations

When you receive your LOGIQ e system, the studies and measurements are organized for typical work flows. If you want, you can change this set up. You can change studies, create studies, and specify which measurements and calculations are in each study. You can change the measurements that are available on the Top/Sub Menu. The LOGIQ e allows you to quickly and easily set up your system so that you can work most efficiently.

For information about how to customize studies and measurements, See ‘Measurement and Calculation Setup’ on *page 7-14 for more information.*

When you make cardiac measurements, the results you see in the Results Window and the Worksheet can vary, depending on what you have set up in the Utility screens.

Generic Study

B-Mode

The Cardiology B-Mode Generic exam category includes the following measurements:

- Caliper
- Point
- Area (Trace)
- Volume
- Volume (d)
- Volume (s)
- Dist (Distance) Ratio
- Area Ratio
- Ellipse
- Open Trace
- R-R
- VF Diam (Diameter)

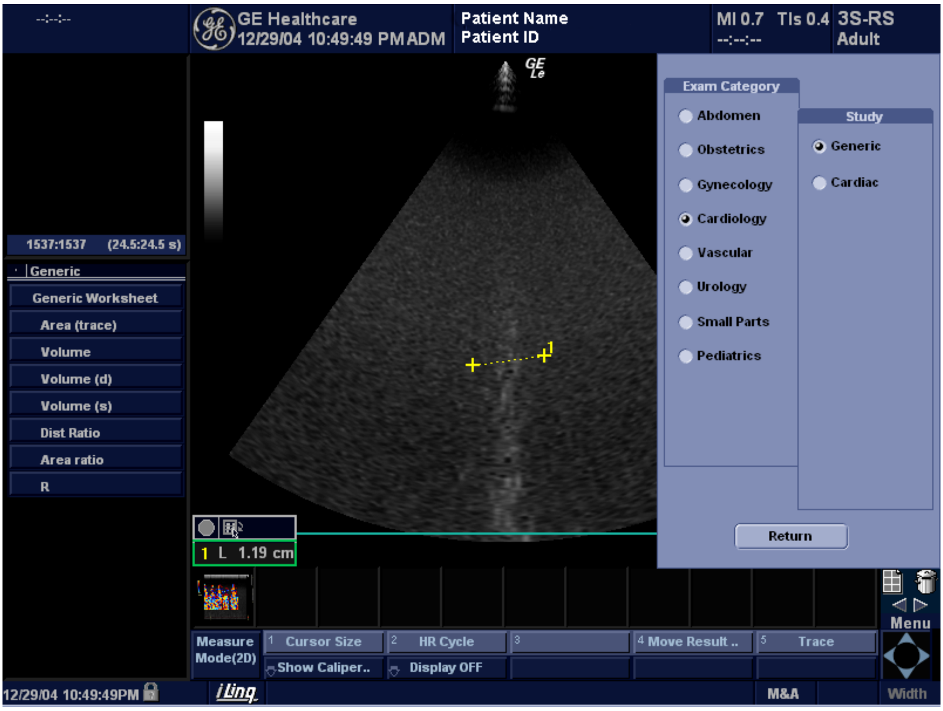

GE Healthcare
12/29/04 10:49:49 PM ADM
Patient Name
Patient ID
MI 0.7 TIs 0.4
3S-RS
Adult
1537:1537 (24.5:24.5 s)
Generic
Generic Worksheet
Area (trace)
Volume
Volume (d)
Volume (s)
Dist Ratio
Area ratio
R
Exam Category
○ Abdomen
○ Obstetrics
○ Gynecology
● Cardiology
○ Vascular
○ Urology
○ Small Parts
○ Pediatrics
Study
● Generic
○ Cardiac
Return
1 L 1.19 cm
Menu
Measure Mode(2D)
1 Cursor Size
Show Caliper..
2 HR Cycle
Display OFF
3
4 Move Result ..
5 Trace
12/29/04 10:49:49PM
M&A
Width

Figure 10-4. Cardiology B-Mode Worksheet Display

M-Mode

The Cardiology B-Mode Generic exam category includes the following measurements:

- LV Study
- LA/Ao
- RV Study
- D-E Excursion
- Depth
- Slope Caliper
- Caliper
- Area Ratio
- Ellipse
- Time
- Heart Rate

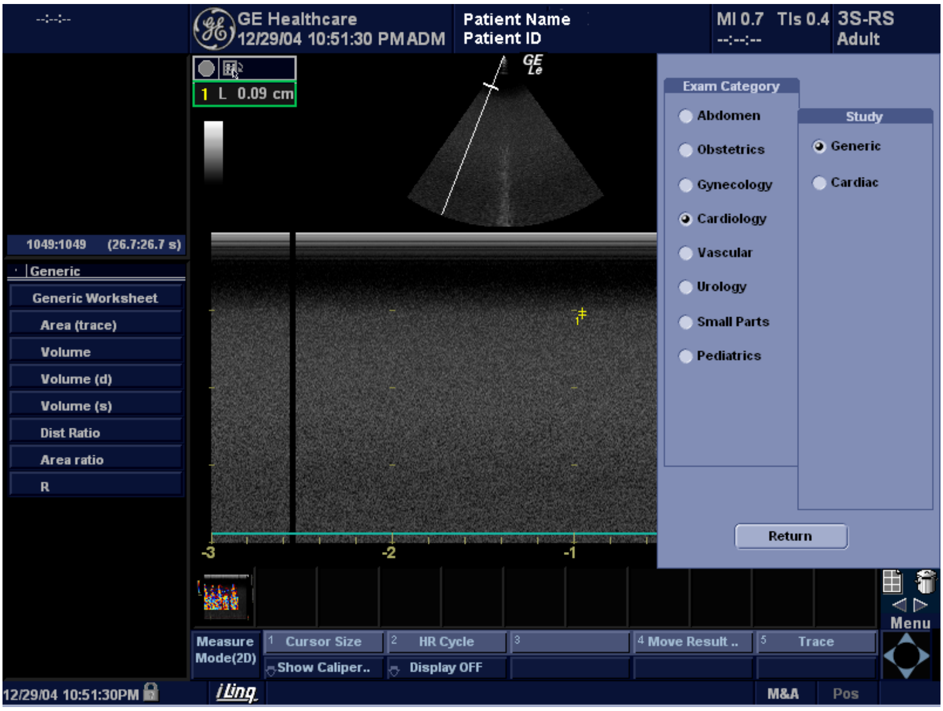
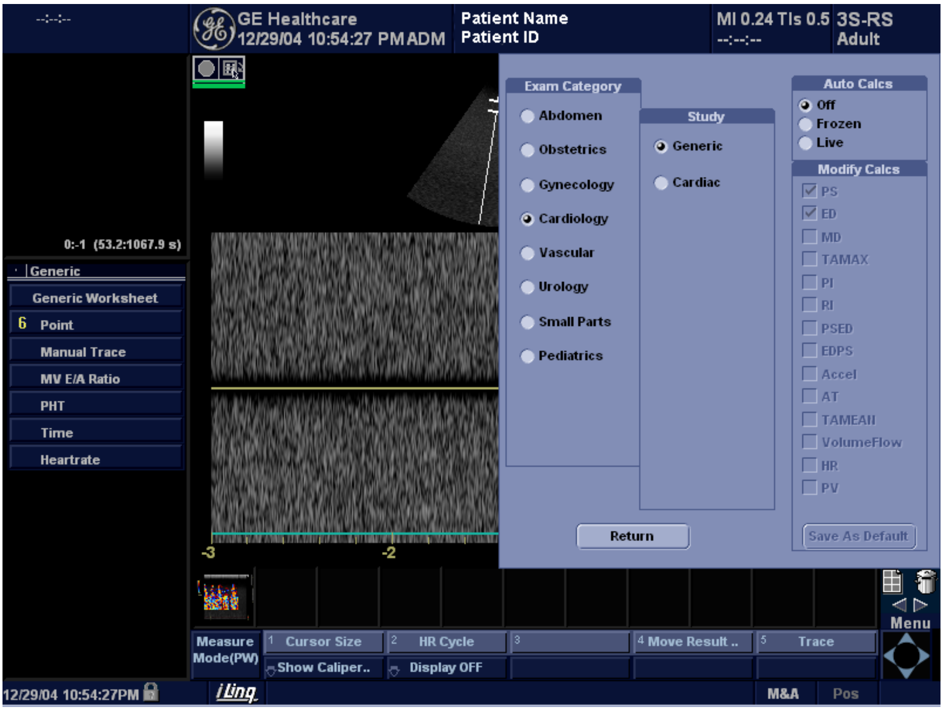

GE Healthcare
12/29/04 10:51:30 PM ADM
Patient Name
Patient ID
MI 0.7 TIs 0.4
3S-RS
Adult
1 L 0.09 cm
1049:1049 (26.7:26.7 s)
Generic
Generic Worksheet
Area (trace)
Volume
Volume (d)
Volume (s)
Dist Ratio
Area ratio
R
Exam Category
Abdomen
Obstetrics
Gynecology
Cardiology
Vascular
Urology
Small Parts
Pediatrics
Study
Generic
Cardiac
Return
-3
-2
-1
Menu
Measure Mode(2D)
Cursor Size
HR Cycle
Move Result ..
Trace
Show Caliper..
Display OFF
12/29/04 10:51:30PM
iLing
M&A
Pos

Figure 10-5. Cardiology M-Mode Worksheet Display

Doppler Mode

The Cardiology Doppler Mode Generic exam category includes the following measurements:

- Point
- Caliper
- Manual Trace
- SD Auto Calcs
- VSD Vmax
- MV E/A Ratio
- PHT
- Time
- Heart Rate



Exam Category
○ Abdomen
○ Obstetrics
○ Gynecology
● Cardiology
○ Vascular
○ Urology
○ Small Parts
○ Pediatrics

Study
● Generic
○ Cardiac

Auto Calcs
● Off
○ Frozen
○ Live

Modify Calcs
☑ PS
☑ ED
☐ MD
☐ TAMAX
☐ PI
☐ RI
☐ PSED
☐ EDPS
☐ Accel
☐ AT
☐ TAMEAN
☐ VolumeFlow
☐ HR
☐ PV

--:--:--
GE Healthcare
12/29/04 10:54:27 PM ADM
Patient Name
Patient ID
MI 0.24 TIs 0.5
3S-RS
Adult
0:-1 (53.2:1067.9 s)
Generic
Generic Worksheet
6 Point
Manual Trace
MV E/A Ratio
PHT
Time
Heartrate
-3
-2
Return
Save As Default
Menu
Measure Mode(PW)
1 Cursor Size
Show Caliper..
2 HR Cycle
Display OFF
3
4 Move Result ..
5 Trace
12/29/04 10:54:27PM
iLinq
M&A
Pos

Figure 10-6. Cardiology Doppler Mode Worksheet Display

ECG Option

Overview

A physiological input panel is available for the LOGIQ e. This panel has inputs for ECG signals.

The scanned image that is displayed is synchronized with the ECG trace. In Doppler or M-Mode, the traces are synchronized to that particular mode’s sweep.

Approved accessory cables provide the proper signals to the Physiological Panel.

WARNING

- This equipment does not have a defibrillator approved applied part.
- Do not use the LOGIQ e Ultrasound system Physiological traces for diagnosis and monitoring.
- Only approved and recommended peripherals and accessories should be used.

NOTE: For a detailed description on ECG, see the ECG (Option) portion of the Console Overview section in Chapter 3.

ECG Top/Sub Menu

The ECG Top/Sub Menu provides for control of the physiological input signals.

Without the ECG option, the ECG Top/Sub Menu is not displayed.

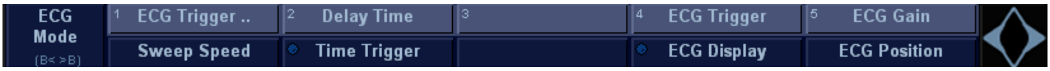

ECG Mode
(B< >B)
1 ECG Trigger ..
Sweep Speed
2 Delay Time
Time Trigger
3
4 ECG Trigger
ECG Display
5 ECG Gain
ECG Position

Figure 10-7. ECG Top/Sub Menu

Sweep Speed

Description	Change the speed of the trace. The sweep speed of the physio signal on the B-Mode image can be set independent of the timeline (Doppler and M-Mode) sweep speed.
Value	1 - 16.

ECG Gain/Position

Description	Allows for the amplitude control of the ECG trace or allows for the vertical positioning of the ECG trace on the image display.
Adjusting	Press the knob to toggle between Gain and Position. The default is Gain.
Value	Gain: 0.00 - 0.23 Position: 0.00 - 100.00

Timer Trigger

Description	Enables intermittent imaging based on a timer.
NOTE:	*If Timer Trigger is turned on, the ECG Trigger is set to None.*
Value	On or Off.

ECG Trigger

Description	Enables intermittent imaging based on the ECG. The trigger location(s) relative to the R trigger are set with the Delay Time key.
Adjusting	Press ECG Trigger and select one of the options and adjust the delay time using the Delay Time key.
	ECG Trig 1 specifies the delay (ms) from R-wave to triggered frame.
	ECG Trig 2 specifies the delay from R-wave to second frame.
	Both activates ECG Trig 1 and ECG Trig 2 simultaneously. Trig 2 must be greater than Trig 1 for dual triggering (Both) to be active.
NOTE:	*If other than None is selected, Timer Trigger is turned off.*
Value	None, Trig1, Trig2, and Both.

Delay Time

Description	In ECG Trigger Mode: If only ECG Trig1 or ECG Trig2 is selected via the ECG Trigger key, the Delay Time key controls the R-Delay time of the active trigger. If both triggers are selected (Both), press this key to toggle ECG Trig1 and ECG Trig2 and rotate the key to change the delay time. Once the trigger is set, the snap shot image is displayed each time the update line passes the active trigger(s).
	In Timer Trigger Mode: Rotating the knob changes the delay time between images.
Adjusting	Adjust the corresponding control.
Value	0.10 - 10.00

Chapter 11

Vascular

Describes how to perform Vascular measurements and calculations.

Vascular Exam Preparation

Introduction

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements is not only determined by the system accuracy, but also by use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigators are so noted. Be sure to refer to the original article describing the investigator's recommended clinical procedures.

General Guidelines

New Patient information must be entered before beginning an exam. See ‘Beginning a New Patient’ on *page 4-3 for more information.*

Any measurement can be repeated by selecting that measurement again from the Top/Sub Menu Menu.

Vascular Measurements

Introduction

Vascular measurements offer several different types of measurement studies:

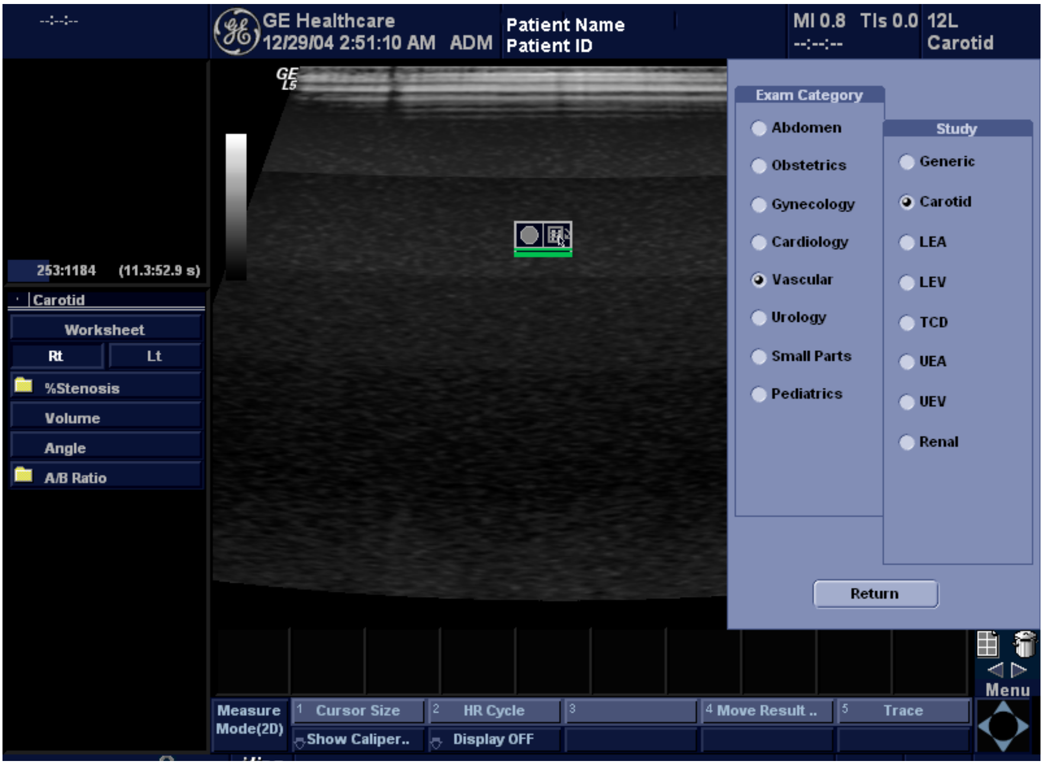

GE Healthcare
12/29/04 2:51:10 AM ADM
Patient Name
Patient ID
MI 0.8 TIs 0.0
12L
Carotid
253:1184 (11.3:52.9 s)
Carotid
Worksheet
Rt
Lt
%Stenosis
Volume
Angle
A/B Ratio
Exam Category
○ Abdomen
○ Obstetrics
○ Gynecology
○ Cardiology
● Vascular
○ Urology
○ Small Parts
○ Pediatrics
Study
○ Generic
● Carotid
○ LEA
○ LEV
○ TCD
○ UEA
○ UEV
○ Renal
Return
Menu
Measure Mode(2D)
1 Cursor Size
2 HR Cycle
3
4 Move Result ..
5 Trace
Show Caliper..
Display OFF

Figure 11-1. Vascular Exam Category Top/Sub Menu

Introduction (continued)

- Generic – Common to all applications. See ‘Generic Measurements’ on *page 7-67 for more information.*
- Carotid
- LEA (Lower Extremity Artery)
- LEV (Lower Extremity Vein)
- TCD (Trans Cranial Doppler)
- UEA (Upper Extremity Artery)
- UEV (Upper Extremity Vein)
- Renal

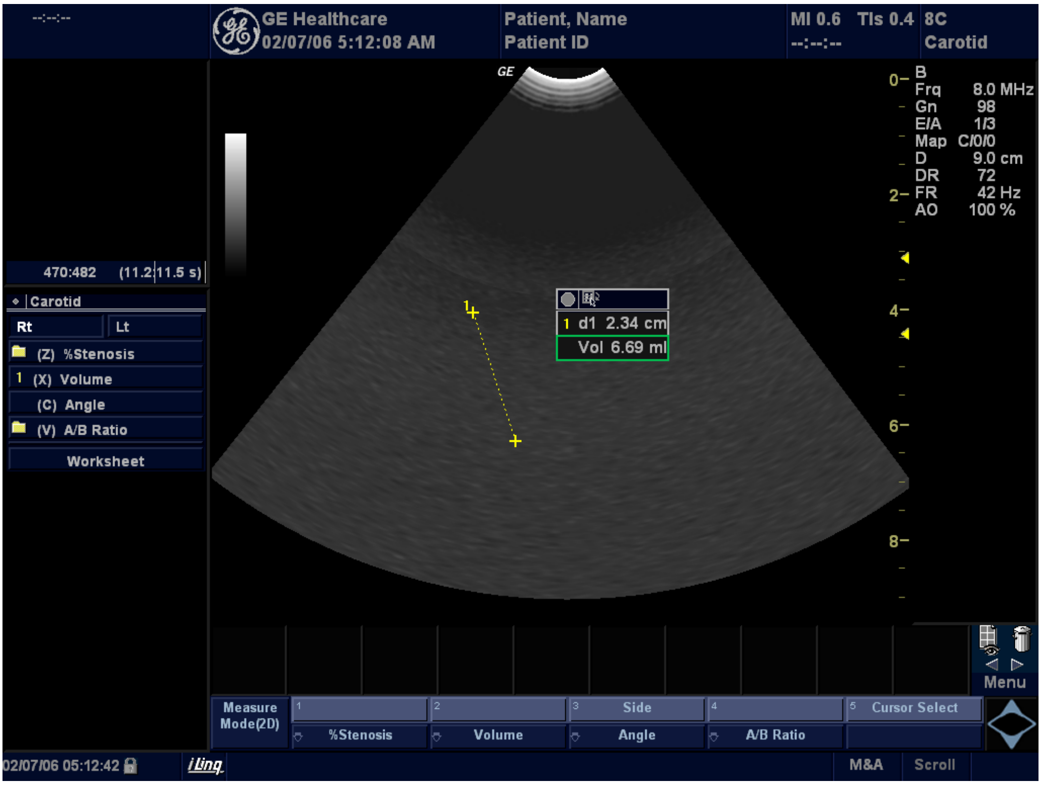
To change an exam calc:

Press the **Measure** key and select the desired calcs folder.

A vascular study is a group of particular vessels. You can customize the vessel exam calcs in the configuration menu. See ‘Measurement and Calculation Setup’ on *page 7-14 for more information.*

When you use Auto Vascular calculation, you use the vessel keys on the Top/Sub Menu to post-assign vascular calculations. When you are not using Auto Vascular calculation, the vessel key is used for manual measurement.

B-Mode Measurements


GE Healthcare
02/07/06 5:12:08 AM
Patient, Name
Patient ID
MI 0.6 TIs 0.4
8C
Carotid
470:482 (11.2|11.5 s)
Carotid
Rt
Lt
(Z) %Stenosis
(X) Volume
(C) Angle
(V) A/B Ratio
Worksheet
Measure Mode(2D)
%Stenosis
Volume
Side
Angle
A/B Ratio
Cursor Select
Menu
02/07/06 05:12:42
iLinq
M&A
Scroll
0
2
4
6
8

B
Frq 8.0 MHz
Gn 98
E/A 1/3
Map C/0/0
D 9.0 cm
DR 72
FR 42 Hz
AO 100 %

1 d1 2.34 cm
Vol 6.69 ml

Figure 11-2. B-Mode Top/Sub Menu

NOTE: The following instructions assume that you first scan the patient and then press ***Freeze****.*

% Stenosis

See '% Stenosis' on *page 7-69 for more information.*

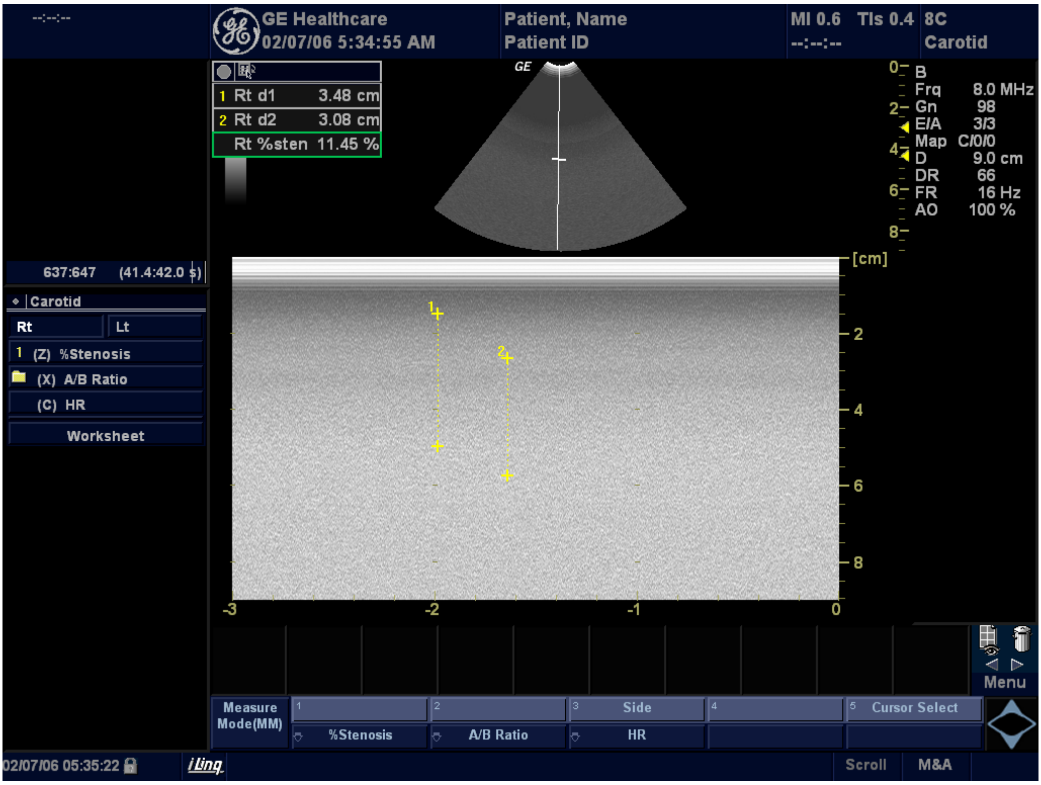
Volume

See 'Volume' on *page 7-71 for more information.*

A/B Ratio

See 'A/B Ratio' on *page 7-76 for more information.*

M-Mode Measurements


GE Healthcare
02/07/06 5:34:55 AM
Patient, Name
Patient ID
MI 0.6 TIs 0.4 8C
Carotid

1 Rt d1 3.48 cm
2 Rt d2 3.08 cm
Rt %sten 11.45 %

B
Frq 8.0 MHz
Gn 98
E/A 3/3
Map C/0/0
D 9.0 cm
DR 66
FR 16 Hz
AO 100 %

637:647 (41.4:42.0 s)
02/07/06 05:35:22

--:--:--
GE
0
2
4
6
8
[cm]
-3
-2
-1
0
1
2
Carotid
Rt
Lt
1 (Z) %Stenosis
(X) A/B Ratio
(C) HR
Worksheet
Menu
Measure Mode(MM)
1
%Stenosis
2
A/B Ratio
3
Side
HR
4
5
Cursor Select
iLinq
Scroll
M&A

Figure 11-3. M-Mode Top/Sub Menu

NOTE: *The following instructions assume that you first scan the patient and then press **Freeze**.*

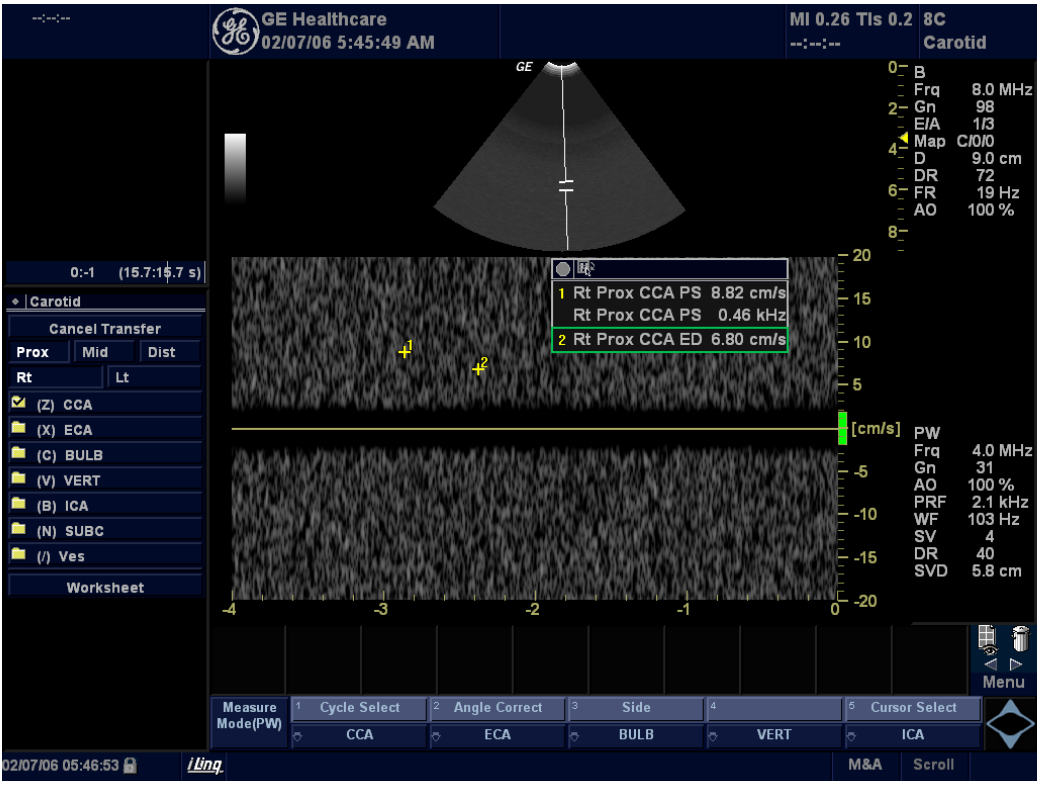
% Stenosis

See '% Stenosis' on *page 7-69 for more information.*

A/B Ratio

See 'A/B Ratio' on *page 7-78 for more information.*

Doppler Mode Measurements



GE Healthcare
02/07/06 5:45:49 AM
MI 0.26 TIs 0.2 8C
Carotid

B
Frq 8.0 MHz
Gn 98
E/A 1/3
Map C/0/0
D 9.0 cm
DR 72
FR 19 Hz
AO 100 %

1 Rt Prox CCA PS 8.82 cm/s
Rt Prox CCA PS 0.46 kHz
2 Rt Prox CCA ED 6.80 cm/s

PW
Frq 4.0 MHz
Gn 31
AO 100 %
PRF 2.1 kHz
WF 103 Hz
SV 4
DR 40
SVD 5.8 cm

02/07/06 05:46:53

--:--:--
GE
0:-1 (15.7:15.7 s)
Carotid
Cancel Transfer
Prox
Mid
Dist
Rt
Lt
(Z) CCA
(X) ECA
(C) BULB
(V) VERT
(B) ICA
(N) SUBC
(/) Ves
Worksheet
0
2
4
6
8
20
15
10
5
[cm/s]
-5
-10
-15
-20
-4
-3
-2
-1
0
Menu
Measure Mode(PW)
1 Cycle Select
2 Angle Correct
3 Side
4
5 Cursor Select
CCA
ECA
BULB
VERT
ICA
iLinq
M&A
Scroll

Figure 11-4. D-Mode Top/Sub Menu Example

Control Assignment

Cancel Transfer After the Auto Vascular calculation results are assigned to a particular vessel, the user can cancel the assignment and assigned parameters are removed from Worksheet page.

When Cancel Transfer occurs, a message appears on the screen to indicate the value was erased from Worksheet page.

Control Assignment (continued)

Vessel location

If the vessel has a location, you can select one of the following:

- Proximal (***Prox***)
- Middle (***Mid***)
- Distal (***Dist***)

NOTE: If you do not wish to assign a vessel location, press the lit location, then no location is assigned. Choose the folder you want the value assigned to.

Side Rt/Lt

The system has measurements for the patient's right and left side. To select right or left, adjust the Top/Sub Menu knob.

Modify Auto Calcs

When you select this key, the Modify Calculation menu is displayed as below. In this menu, you select parameters to display in the Auto Vascular Calculation window. Only parameters that can be used by the calculation are displayed.

Select ***Save as Default*** to save the selected parameters as the default calculations for this application.

Select Live, Frozen or Off for ***Auto Calcs***.

- Live displays the trace, calipers and results.
- Frozen: displays the trace, calipers and results when you press **Freeze**.
- Off

Select ***Return*** to return to the previous Top/Sub Menu screen.

Modify Auto Calcs (continued)

If you select ***PV***, all selected parameters are turned off. When you deselect ***PV***, the system returns to the previously selected calculation.

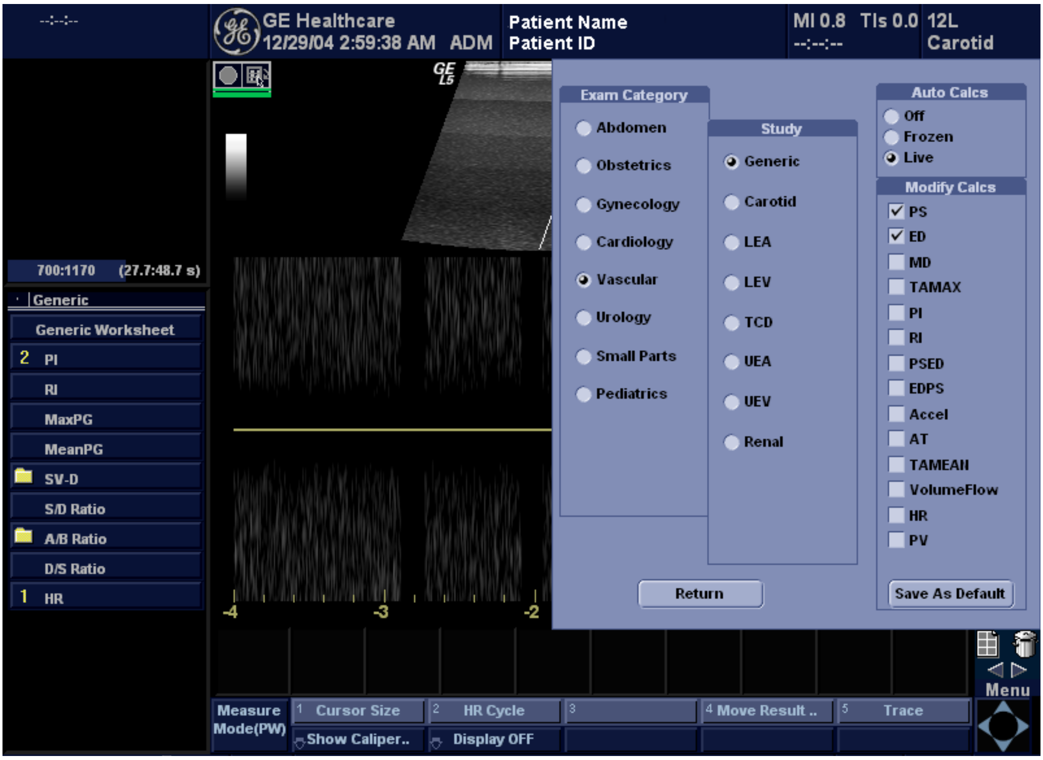

GE Healthcare
12/29/04 2:59:38 AM ADM
Patient Name
Patient ID
MI 0.8 TIs 0.0 12L
Carotid
700:1170 (27.7:48.7 s)
Generic
Generic Worksheet
2 PI
RI
MaxPG
MeanPG
SV-D
S/D Ratio
A/B Ratio
D/S Ratio
1 HR
-4
-3
-2
Exam Category
○ Abdomen
○ Obstetrics
○ Gynecology
○ Cardiology
● Vascular
○ Urology
○ Small Parts
○ Pediatrics
Study
● Generic
○ Carotid
○ LEA
○ LEV
○ TCD
○ UEA
○ UEV
○ Renal
Auto Calcs
○ Off
○ Frozen
● Live
Modify Calcs
☑ PS
☑ ED
☐ MD
☐ TAMAX
☐ PI
☐ RI
☐ PSED
☐ EDPS
☐ Accel
☐ AT
☐ TAMEAN
☐ VolumeFlow
☐ HR
☐ PV
Return
Save As Default
Menu
Measure Mode(PW)
1 Cursor Size
Show Caliper..
2 HR Cycle
Display OFF
3
4 Move Result ..
5 Trace

Figure 11-5. Modify Auto Calculation Menu (Page1)

Naming format for vessels

When you want to measure a vessel, on the Top/Sub Menu you select the folder for the vessel. Many vessel folders are labeled with an abbreviation. The following table lists abbreviations used for naming vascular vessels.

Table 11-1: Vascular Vessel Abbreviations

Acronym	Name
ACA	Anterior Cerebral Artery
AComA	Anterior Communicating Artery
ATA	Anterior Tibial Artery
ATV	Anterior Tibial Vein
Axill	Axillary Artery
Axill V	Axillary Vein
BA	Basilar Artery or Brachial Artery
Ba V	Basilic Vein
Br V	Brachial Vein
CCA	Common Carotid Artery
Ceph V	Cephalic Vein
CFV	Common Femoral Vein
CHA	Common Hepatic Artery
Com Femoral	Common Femoral Artery
CIA	Common Iliac Artery
CIV	Common Iliac Vein
Com Iliac A	Common Iliac Artery
DFA	Deep Femoral Artery
DFV	Deep Femoral Vein
Dors Pedis	Dorsalis Pedis
DPA	Dorsalis Pedis Artery
ECA	Exterior Carotid Artery
EIA	External Iliac Artery
EIV	External Iliac Vein
FV	Femoral Vein

Table 11-1: Vascular Vessel Abbreviations

Acronym	Name
GSV	Greater Saphenous Vein
ICA	Internal Carotid Artery (Transcranial Doppler)
ICA	Interior Carotid Artery (Carotid Artery)
IJV	Internal Jugular Vein
IMA	Inferior Mesenteric Artery
Inn	Innominate
IVC	Inferior Vena Cava
LSV	Lesser Saphenous Vein
MCA	Middle Cerebral Artery
Mcub V	Median Cubital Vein
Mid Hep V	Middle Hepatic Vein
MRA	Main Renal Artery
PCA	Posterior Cerebral Artery
PComA	Posterior Communicating Artery
Peron	Peroneal
POP	Popliteal
PTA	Posterior Tibial Artery
PTV	Posterior Tibial Vein
RA	Radial Artery
SMA	Superior Mesenteric Artery
SMV	Superior Mesenteric Vein
SUBC	Subclavian Artery
SUBC V	Subclavian Vein
SFA	Superficial Femoral Artery
TCD	Transcranial Doppler
TIPS	Transjugular Intrahepatic Portosystemic Shunt
UA	Ulnar Artery
VERT	Vertebral Artery

Auto Vascular Calculation Overview

Auto Vascular Calculation enables the LOGIQ e to detect and identify a cardiac cycle. It allows you to assign measurements and calculations during live timeline imaging, while the image is frozen, or in CINE. Peak values are detected for venous flow.

During cardiac cycle detection, the system identifies the cardiac cycle using calipers, vertical bars, and/or highlighting of timeline data. Use of identifiers is based on measurements and calculations selected by an operator for the current application. The system may place calipers at early systolic peak, peak systole, minimum diastole and end diastole. Vertical bars may also be placed to indicate the beginning and end of the cardiac cycle. The peak and/or mean trace may be highlighted. You can edit the cardiac cycle identified by the system or select a different cardiac cycle.

You can select the calculations to be displayed in the M&A Result window during live scanning or on a frozen image. These calculations are displayed at the top of M&A Result Window located adjacent to the image. These calculations are presettable by application which means you can set up the default calculations to be displayed for each application.

Auto Vascular Calculation

Activating Auto Vascular Calculation

To activate Auto Vascular Calculation, select the **Auto Calc** Top/Sub Menu key to select Live (calculations displayed on the real-time image), or Freeze (calculations displayed on the frozen image).

To deactivate Auto Vascular calculation, select Off.

Setting up Auto Vascular Calculation Parameters

- **Selecting Auto Trace**

  You can select to have a continuous auto trace of the max or mean velocities.

  - Select Max or Mean using the ***Trace Method*** Top/Sub Menu.

- **Selecting Trace Detection**

  Trace Detection lets you use peak timeline data above, below, or composite (above and below) the baseline.

  - Select Positive, Negative, or Both to set the peak timeline data.

- **Modify Calculation**

  a. Select the ***Modify Calcs*** Top/Sub Menu key.

     The Modify Calculation menu is displayed.

  b. Select which measurements and calculations are to be displayed in the Auto Vascular calculation window.

     You can select the following parameter: PS, ED, MD, HR, TAMAX, PI, RI, Accel, PS/ED, ED/PS, AT, Volume Flow, PV.

     For the measurements to remain and be used again, select ***Save As Default*** within this menu.

Auto Vascular Calculation (continued)

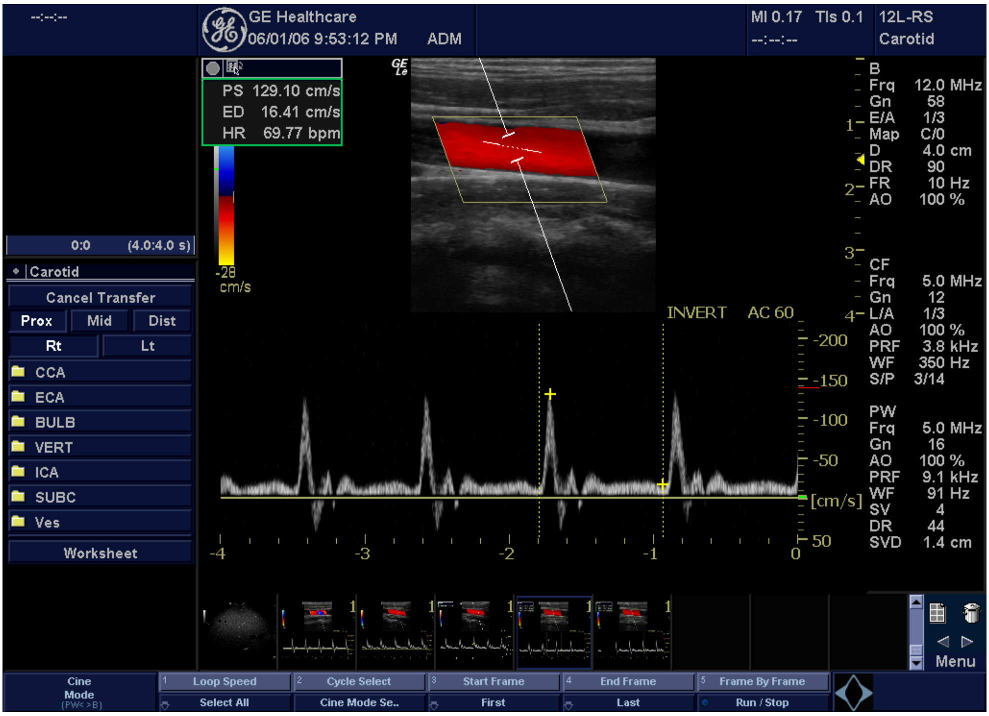
Auto Vascular Calculation Exam

1. Preset the system.
2. Perform the scan and press **Freeze**.
3. Activate Auto Calculations (Live or Frozen) from the Top/ Sub Menu.

   The system performs a calculation automatically.

   The Auto calculation is assigned to particular vessel measurements.
4. Press **Measure** to display the Measurement menu.
5. Select the location of the vessel (Prox, Mid, or Dist) and Side (Right or Left).
6. Select the desired vessel name from the Top/Sub Menu.

   Selected vessel measurements are automatically assigned with the Auto Vascular calculation. The results are then displayed in the Results Window.


GE Healthcare
06/01/06 9:53:12 PM ADM
MI 0.17 TIs 0.1
12L-RS
Carotid

PS 129.10 cm/s
ED 16.41 cm/s
HR 69.77 bpm

B
Frq 12.0 MHz
Gn 58
E/A 1/3
Map C/0
D 4.0 cm
DR 90
FR 10 Hz
AO 100 %

CF
Frq 5.0 MHz
Gn 12
L/A 1/3
AO 100 %
PRF 3.8 kHz
WF 350 Hz
S/P 3/14

PW
Frq 5.0 MHz
Gn 16
AO 100 %
PRF 9.1 kHz
WF 91 Hz
SV 4
DR 44
SVD 1.4 cm

--:--:--
0:0 (4.0:4.0 s)
Carotid
Cancel Transfer
Prox
Mid
Dist
Rt
Lt
CCA
ECA
BULB
VERT
ICA
SUBC
Ves
Worksheet
-28
cm/s
INVERT
AC 60
-200
-150
-100
-50
[cm/s]
50
-4
-3
-2
-1
0
1
2
3
4
Menu
Cine Mode
(PW< >B)
Loop Speed
Select All
Cycle Select
Cine Mode Se..
Start Frame
First
End Frame
Last
Frame By Frame
Run / Stop

Figure 11-6. Assigned Vessel

Auto Vascular Calculation (continued)

NOTE: *When you want to cancel the assignment, you can use the **Cancel Transfer** Top/Sub Menu key. See 'Cancel Transfer' on page 11-7 for more information.*

During the course of an exam, the cardiac cycle may be indicated between two yellow bars; the peak trace and the mean trace may appear in green; calculation indicators appear on the spectral trace as a caliper identifier (these vary, depending on the selected calculation in the Results Window).

The right-most, most complete cycle is typically chosen to be the selected cardiac cycle. You can select a different cardiac cycle.

To select a different cardiac cycle:

- Move through CINE memory with the Trackball until the desired cardiac cycle is selected by the system.

NOTE: *You need several good cycles in front of the new cardiac cycle for this to be successful. Oftentimes, this is problematic near a freeze bar.*

- Use the ***Cycle Select*** control to cycle to a different cardiac cycle.

To move the systole or diastole position:

- Use the ***Cursor Select*** control to move the start systole position or the end diastole position..

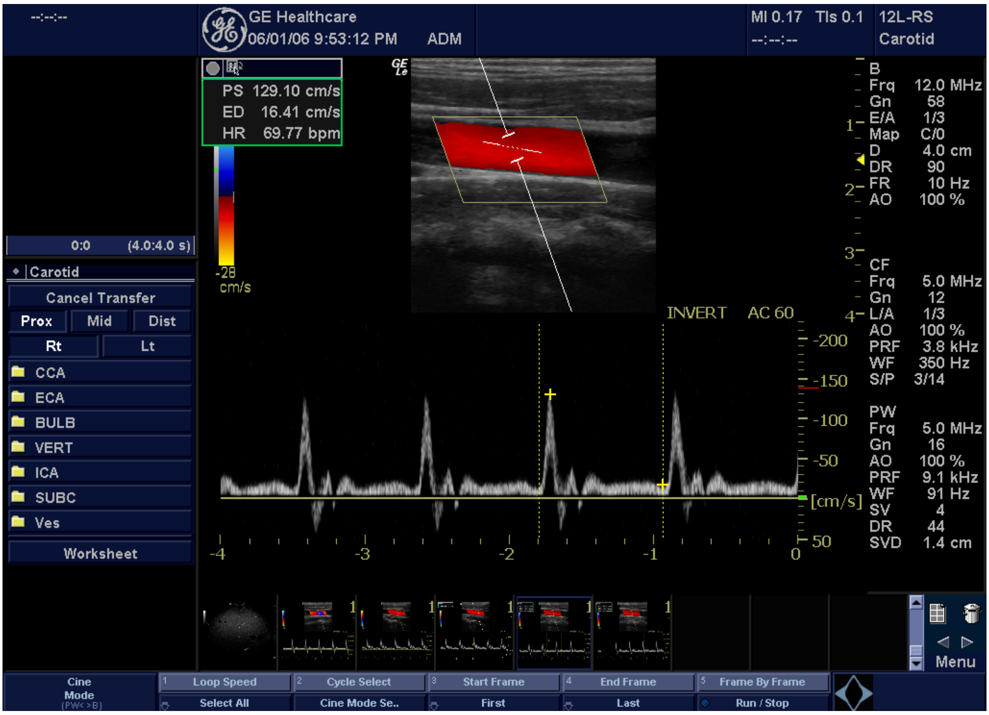
Manual Vascular Calculation

You can perform the following calculations manually when Auto Doppler Calculation is not activated.

1. Press **Measure**.

   If necessary, you can select another Exam Calc and then select parameters from Modify Calculation.
2. Select the location of the vessel (Prox, Mid, or Dist) and Side (Right or Left).
3. Select the desired vessel folder.

   The Measurement menu is displayed.



GE Healthcare
06/01/06 9:53:12 PM ADM
MI 0.17 TIs 0.1
12L-RS
Carotid

PS 129.10 cm/s
ED 16.41 cm/s
HR 69.77 bpm

B
Frq 12.0 MHz
Gn 58
E/A 1/3
Map C/0
D 4.0 cm
DR 90
FR 10 Hz
AO 100 %

CF
Frq 5.0 MHz
Gn 12
L/A 1/3
AO 100 %
PRF 3.8 kHz
WF 350 Hz
S/P 3/14

PW
Frq 5.0 MHz
Gn 16
AO 100 %
PRF 9.1 kHz
WF 91 Hz
SV 4
DR 44
SVD 1.4 cm

INVERT AC 60

--:--:--
0:0 (4.0:4.0 s)
Carotid
Cancel Transfer
Prox
Mid
Dist
Rt
Lt
CCA
ECA
BULB
VERT
ICA
SUBC
Ves
Worksheet
-28
cm/s
1
2
3
4
-200
-150
-100
-50
[cm/s]
50
-4
-3
-2
-1
0
Menu
Cine Mode (PW<>B)
Loop Speed
Select All
Cycle Select
Cine Mode Se..
Start Frame
First
End Frame
Last
Frame By Frame
Run / Stop

Figure 11-7. Measurement Menu Example

4. Make the required measurements according to the system, or select your preferred measurements.

Manual Vascular Calculation (continued)

For each vessel in Doppler mode, you can make any of the following measurements:

- Peak Systole (PS)
- End Diastole (ED)
- Minimum Diastole (MD)
- Heart Rate
- TAMAX
- TAMEAN
- Pulsatility Index (PI)
- Resistive Index (RI)
- S/D Ratio
- D/S Ratio
- Acceleration (Accel)
- Acceleration Time (AT)
- Volume Flow
- Peak Value (PV)

To select vascular measurements

Your system is set up to show the measurements that you usually make for each vessel. To make a measurement that is not shown for the selected vessel:

1. Select the folder for the vessel you want to measure.

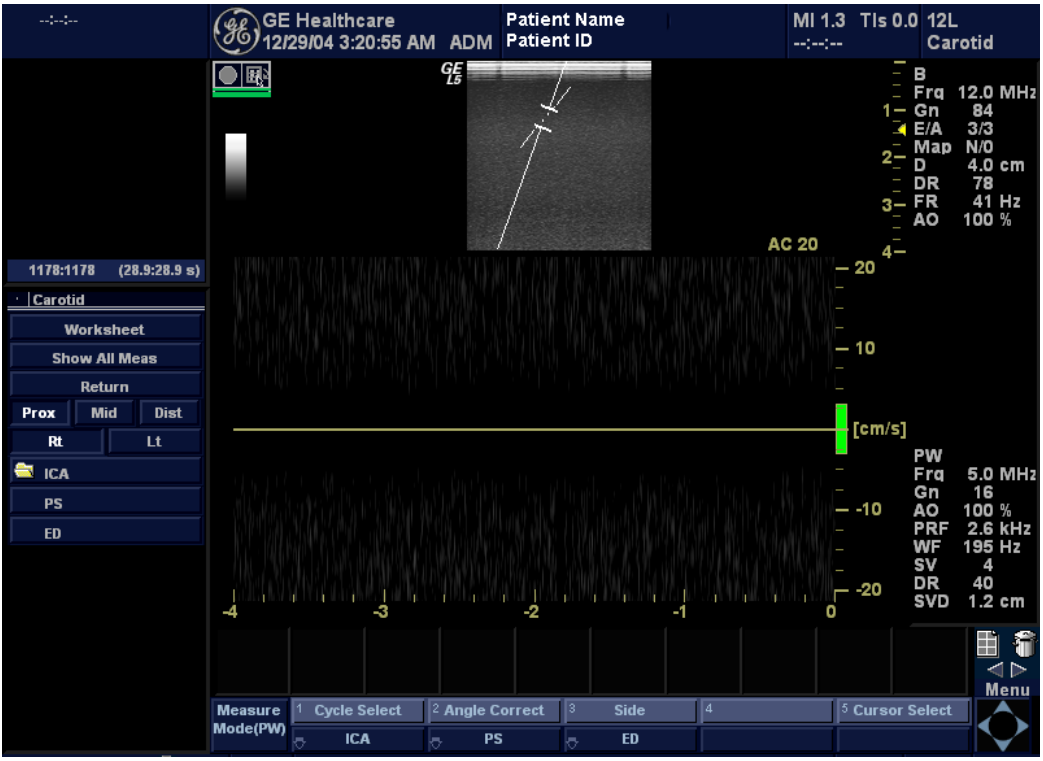

GE Healthcare
12/29/04 3:20:55 AM ADM
Patient Name
Patient ID
MI 1.3 TIs 0.0 12L
Carotid
1178:1178 (28.9:28.9 s)
Carotid
Worksheet
Show All Meas
Return
Prox
Mid
Dist
Rt
Lt
ICA
PS
ED
AC 20
[cm/s]
Measure Mode(PW)
Cycle Select
Angle Correct
Side
Cursor Select
ICA
PS
ED
Menu

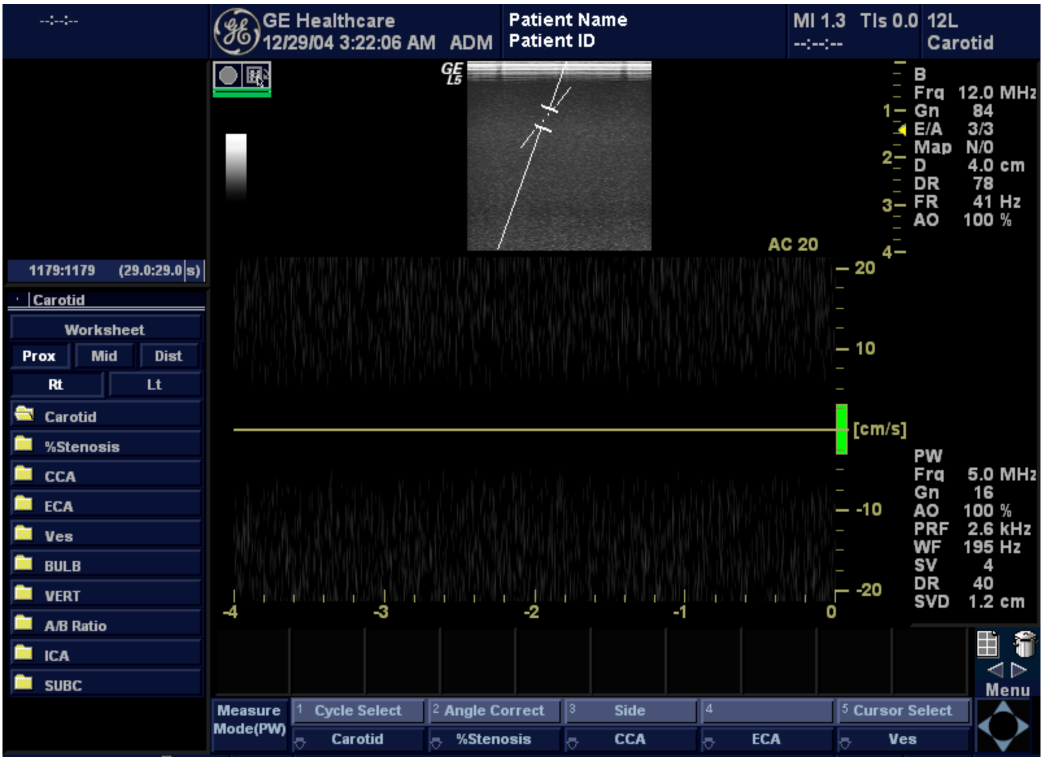
Figure 11-8. ICA folder

2. Select ***Show All***.

   The system displays all possible vessel measurements.

To select vascular measurements (continued)

3. Select the desired measurement.



GE Healthcare
12/29/04 3:22:06 AM ADM
Patient Name
Patient ID
MI 1.3 TIs 0.0 12L
Carotid

B
Frq 12.0 MHz
Gn 84
E/A 3/3
Map N/0
D 4.0 cm
DR 78
FR 41 Hz
AO 100 %

PW
Frq 5.0 MHz
Gn 16
AO 100 %
PRF 2.6 kHz
WF 195 Hz
SV 4
DR 40
SVD 1.2 cm

--:--:--
1179:1179 (29.0:29.0 s)
Carotid
Worksheet
Prox
Mid
Dist
Rt
Lt
Carotid
%Stenosis
CCA
ECA
Ves
BULB
VERT
A/B Ratio
ICA
SUBC
AC 20
20
10
[cm/s]
-10
-20
-4
-3
-2
-1
0
1
2
3
4
Menu
Measure Mode(PW)
1 Cycle Select
2 Angle Correct
3 Side
4
5 Cursor Select
Carotid
%Stenosis
CCA
ECA
Ves

Figure 11-9. Show All measurements

*NOTE: The following instructions assume that you first scan the patient and then press **Freeze**.*

Acceleration

1. Select ***Accel***.

   The system displays an active caliper with vertical and horizontal dotted lines.
2. To position the caliper at peak systole, move the **Trackball**.
3. To fix the measure point, press **Set**.

   The system displays a second active caliper.
4. To position the second caliper at end diastole, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the peak systole, end diastole, acceleration time, and acceleration in the Results Window.

Acceleration Time (AT)

1. Select ***AT***.

   The system displays an active caliper and a vertical dotted line.
2. To position the caliper at the start point, move the **Trackball**.
3. To fix the first caliper, press **Set**.

   The system displays a second active caliper.
4. To position the caliper at the end point, move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the acceleration time in the Results Window.

Heart Rate

See ‘Heart Rate’ on *page 7-79 for more information.*

Peak Systole (PS), End Diastole (ED), or Minimum Diastole (MD)

To calculate the peak systole, end diastole, or minimum diastole:

1. Select ***PS***, ***ED***, or ***MD***.

   The system displays an active caliper with vertical and horizontal dotted lines.
2. To position the caliper at the measurement point, move the **Trackball**.
3. To complete the measurement, press **Set**.

   The system displays the peak systole, end diastole, or minimum diastole in the Results Window.

ED/PS or PS/ED Ratio

To calculate the End Diastole/Peak Systole ratio or Peak Systole/End Diastole ratio:

1. Select ***ED/PS*** or ***PS/ED***.

   The system displays an active caliper with vertical and horizontal dotted lines.
2. To position the caliper at end diastole (ED) or peak systole (PS), move the **Trackball**.
3. To fix the measure point, press **Set**.

   The system displays a second active caliper.
4. To position the second caliper at peak systole (PS) or end diastole (ED), move the **Trackball**.
5. To complete the measurement, press **Set**.

   The system displays the end diastole, peak systole, and ED/PS or PS/ED ratio in the Results Window.

Pulsatility Index (PI)

See ‘Pulsatility Index (PI)’ on *page 7-82 for more information.*

S/D or D/S Ratio

See ‘PS/ED or ED/PS Ratio’ on *page 7-84 for more information.*

Resistive Index (RI)

See ‘Resistive Index (RI)’ on *page 7-83 for more information.*

TAMAX and TAMEAN

See ‘TAMAX and TAMEAN’ on *page 7-56 for more information.*

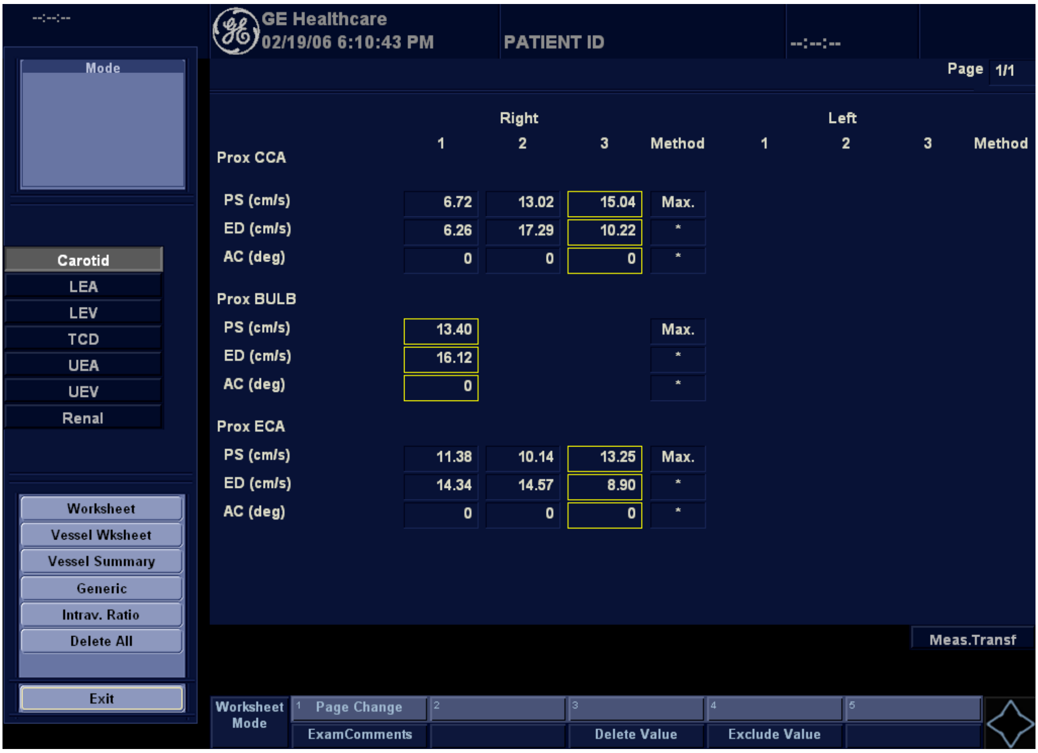
Vascular Worksheet

The vascular worksheet is structured to automatically display vascular measurements made at specific anatomical sites. The worksheet can also display an average, last, maximum, or minimum value of the latest three measurements. Calculated ratios are automatically summarized and displayed.

To view the Vascular Worksheet

1. Press **Measure**.
2. Select ***Worksheet Display***.

   The system displays the worksheet.


--:--:--
GE Healthcare
02/19/06 6:10:43 PM
PATIENT ID
--:--:--
Page 1/1
Mode
Carotid
LEA
LEV
TCD
UEA
UEV
Renal
Worksheet
Vessel Wksheet
Vessel Summary
Generic
Intrav. Ratio
Delete All
Exit
Meas.Transf
Worksheet Mode
1 Page Change
ExamComments
2
3 Delete Value
4 Exclude Value
5

		Right				Left		
	1	2	3	Method	1	2	3	Method
Prox CCA								
PS (cm/s)	6.72	13.02	15.04	Max.				
ED (cm/s)	6.26	17.29	10.22	*				
AC (deg)	0	0	0	*				
Prox BULB								
PS (cm/s)	13.40			Max.				
ED (cm/s)	16.12			*				
AC (deg)	0			*				
Prox ECA								
PS (cm/s)	11.38	10.14	13.25	Max.				
ED (cm/s)	14.34	14.57	8.90	*				
AC (deg)	0	0	0	*				

Figure 11-10. Vascular Worksheet Example

To view the Vascular Worksheet (continued)

Only measured parameters are displayed. Location information is labeled with vessel name first. Measured parameters of the vessel are grouped under the vessel label.

Selected value by method is highlighted, however, when the average method is selected, the highlighted cursor is removed.

When an entire vessel measurement does not have sides (left or right), the side label is not displayed in that vessel study worksheet.

HINTS

Some fields on the worksheet are view only, and others you can change or select. To easily see which fields you can change or select, move the **Trackball**. As the cursor moves over a field that you can change or select, the field is highlighted.

Worksheet Display Top/Sub Menu

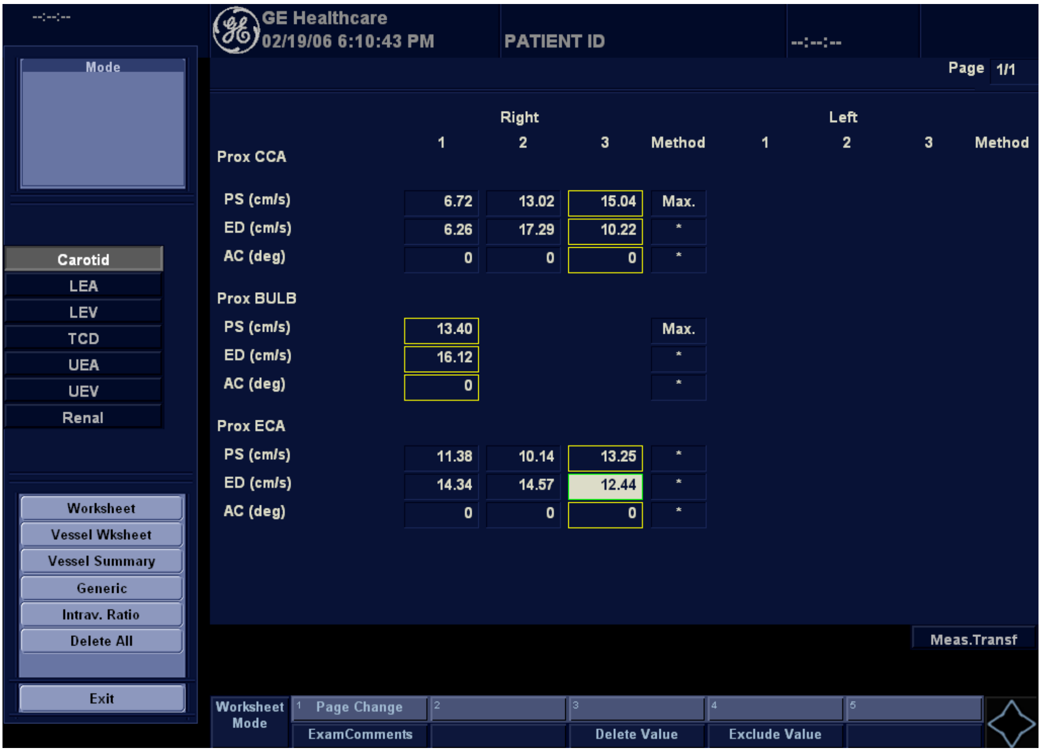
1. **Worksheet Display**: To exit the worksheet display and return to scanning.
2. **Vessel Worksheet**: Select this key to display the Vessel Worksheet when the Vessel Summary is displayed.
3. **Vessel Summary**: Select this key to display the Vessel Summary when the Vessel Worksheet is displayed.
4. **Examiner's Comment**: Select this key to display the Examiner's comment window. See 'Examiner's Comments' on *page 11-30 for more information.*
5. **Generic Worksheet**: Select this key to display the Generic Worksheet. Generic study measurements/calculations, such as volume and velocity, are displayed on this worksheet.
6. **Delete Value**: Use to delete a value (each measurement value). See 'To edit a worksheet' on *page 11-26 for more information.*
7. **Exclude Value**: Use to exclude a value from the result line. See 'To edit a worksheet' on *page 11-26 for more information.*
8. **Intravessel Ratio**: Select this key to display the Intravessel Ratio Calculation window. See 'Intravessel ratio' on *page 11-31 for more information.*
9. **Page Change** (knob): If a worksheet has more data, to view the next page, adjust the Page Change knob.

To edit a worksheet

1. Select **Worksheet Display** from any page of the Vascular Calculation Top/Sub Menu.
2. To position the cursor at the field you want to change, move the **Trackball**.

   The field is highlighted.
3. Type the new data in the field and move the cursor to another place, then the new data is displayed in blue and asterisk are appended to value and resultant value to indicate that it was manual entered.

   The average measurements, calculations and ratios are automatically updated to reflect the edited values.


--:--:--
Mode
Carotid
LEA
LEV
TCD
UEA
UEV
Renal
Worksheet
Vessel Wksheet
Vessel Summary
Generic
Intrav. Ratio
Delete All
Exit
Meas.Transf
Worksheet Mode
1 Page Change
ExamComments
2
3 Delete Value
4 Exclude Value
5

GE Healthcare
02/19/06 6:10:43 PM
PATIENT ID
--:--:--
Page 1/1

	Right 1	Right 2	Right 3	Method	Left 1	Left 2	Left 3	Method
Prox CCA								
PS (cm/s)	6.72	13.02	15.04	Max.				
ED (cm/s)	6.26	17.29	10.22	*				
AC (deg)	0	0	0	*				
Prox BULB								
PS (cm/s)	13.40			Max.				
ED (cm/s)	16.12			*				
AC (deg)	0			*				
Prox ECA								
PS (cm/s)	11.38	10.14	13.25	*				
ED (cm/s)	14.34	14.57	12.44	*				
AC (deg)	0	0	0	*				

Figure 11-11. Display of the edited value

*NOTE: If the user moves the cursor to the edited value and presses the **Set** key once, the value returns to the original value before the edit.*

To edit a worksheet (continued)

To delete data:

Delete Value key is used to delete value (each measured value). Whenever particular value is deleted, the group (set) of the measurement/study value is also deleted from the worksheet as a group (set). When PS value is deleted, ED and RI is also deleted if this value was measured as the set of RI measurement.

1. Select **Worksheet** from any page of the Vascular Calculation Top/Sub Menu Menu.
2. To position the cursor at the field you want to delete or exclude, move the **Trackball**.

   The field is highlighted.
3. Select ***Delete Value***.

For Example:

1. If the user measured RI 4 times, however, latest 3 sets of measurements were displayed in the worksheet.

Result Number	#2	#3	#4
PS	0.500	0.600	0.700
ED	0.100	0.200	0.300
RI	0.800	0.667	0.571

1. Then, the user deleted PS value of #3 from the worksheet.
2. The whole set of #3 measurements is deleted from the worksheet and #1 set of measurements is shifted and displayed as below.

Result Number	#1	#2	#4
PS	0.400	0.500	0.700
ED	0.000	0.100	0.300
RI	1.000	0.800	0.571

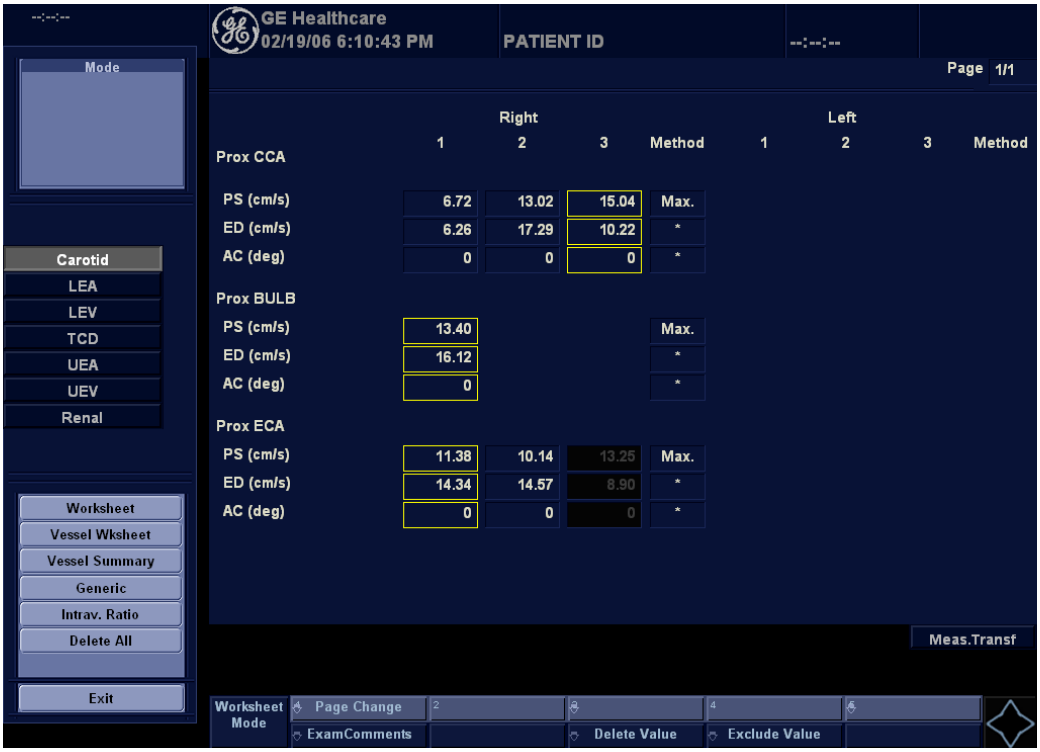
To edit a worksheet (continued)

To exclude data:

When the user selects a particular value on the Worksheet and selects ***Exclude Value***, this value is excluded from result line and resultant value is re-calculated without this value and also calculation values using this value is 'blank'.

1. Select **Worksheet Display** from any page of the Vascular Calculation Top/Sub Menu Menu.
2. To position the cursor at the field you want to delete or exclude, move the **Trackball**.

   The field is highlighted.
3. Select ***Exclude Value***.
4. The data in the field is not visible and is not included in worksheet calculations as below.
5. To include a value that you previously excluded, select ***Exclude Value***.



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GE Healthcare
02/19/06 6:10:43 PM

PATIENT ID

--:--:--

Page 1/1

	Right				Left			
	1	2	3	Method	1	2	3	Method
Prox CCA								
PS (cm/s)	6.72	13.02	15.04	Max.				
ED (cm/s)	6.26	17.29	10.22	*				
AC (deg)	0	0	0	*				
Prox BULB								
PS (cm/s)	13.40			Max.				
ED (cm/s)	16.12			*				
AC (deg)	0			*				
Prox ECA								
PS (cm/s)	11.38	10.14	13.25	Max.				
ED (cm/s)	14.34	14.57	8.90	*				
AC (deg)	0	0	0	*				

Mode
Carotid
LEA
LEV
TCD
UEA
UEV
Renal
Worksheet
Vessel Wksheet
Vessel Summary
Generic
Intrav. Ratio
Delete All
Exit
Meas.Transf
Worksheet Mode
Page Change
ExamComments
2
Delete Value
4
Exclude Value

Figure 11-12. Display of the excluded value

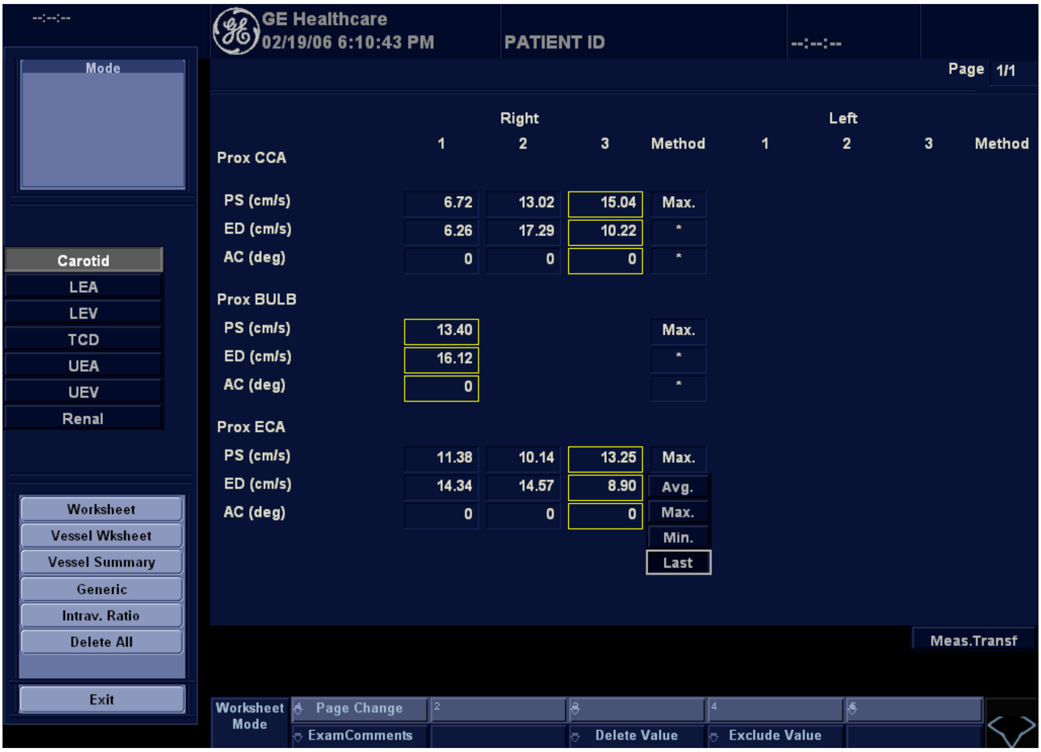
To edit a worksheet (continued)

To select the method:

The user can select the method for calculating the cumulative value.

This value is only calculated by using displaying values. If the user takes parameters more than 3 times, latest 3 values are used for this calculation.

1. Move cursor to method column and press **Set**.
2. The pull-down menu is displayed. Move to cursor any one of methods and press **Set**. The selected method is displayed in the column.


--:--:--
Mode
Carotid
LEA
LEV
TCD
UEA
UEV
Renal
Worksheet
Vessel Wksheet
Vessel Summary
Generic
Intrav. Ratio
Delete All
Exit
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Page 1/1
Avg.
Max.
Min.
Last
Meas.Transf
Worksheet Mode
Page Change
2
4
ExamComments
Delete Value
Exclude Value

	Right				Left			
	1	2	3	Method	1	2	3	Method
Prox CCA								
PS (cm/s)	6.72	13.02	15.04	Max.				
ED (cm/s)	6.26	17.29	10.22	*				
AC (deg)	0	0	0	*				
Prox BULB								
PS (cm/s)	13.40			Max.				
ED (cm/s)	16.12			*				
AC (deg)	0			*				
Prox ECA								
PS (cm/s)	11.38	10.14	13.25	Max.				
ED (cm/s)	14.34	14.57	8.90	Avg.				
AC (deg)	0	0	0	Max.				

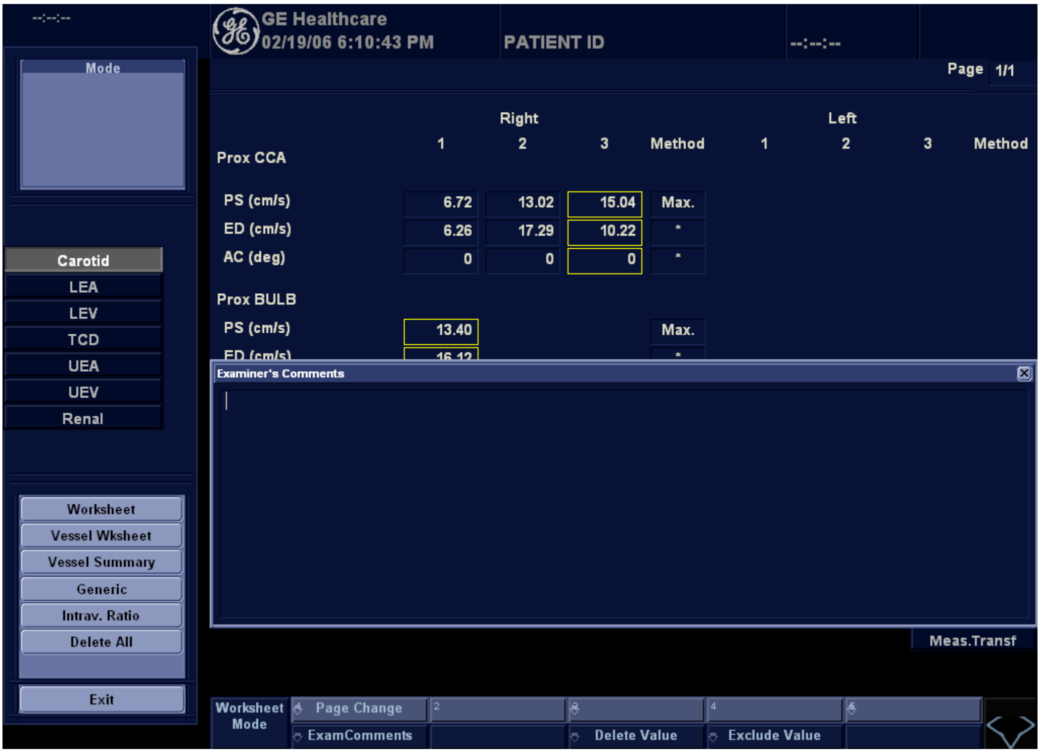
Figure 11-13. Pop-up menu of methods

Examiner's Comments

To type a comment on a worksheet:

1. Select ***Examiner's Comments***.

   The Examiner's Comments window opens.
2. Type comments about the exam.
3. To close the Examiner's Comments window, select ***Examiner's Comments***.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GE Healthcare
02/19/06 6:10:43 PM
PATIENT ID
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Page 1/1
Mode
Carotid
LEA
LEV
TCD
UEA
UEV
Renal
Worksheet
Vessel Wksheet
Vessel Summary
Generic
Intrav. Ratio
Delete All
Exit
Examiner's Comments
Meas.Transf
Worksheet Mode
Page Change
ExamComments
2
Delete Value
4
Exclude Value

	Right 1	Right 2	Right 3	Method	Left 1	Left 2	Left 3	Method
Prox CCA								
PS (cm/s)	6.72	13.02	15.04	Max.				
ED (cm/s)	6.26	17.29	10.22	*				
AC (deg)	0	0	0	*				
Prox BULB								
PS (cm/s)	13.40			Max.				
ED (cm/s)	16.12			*				

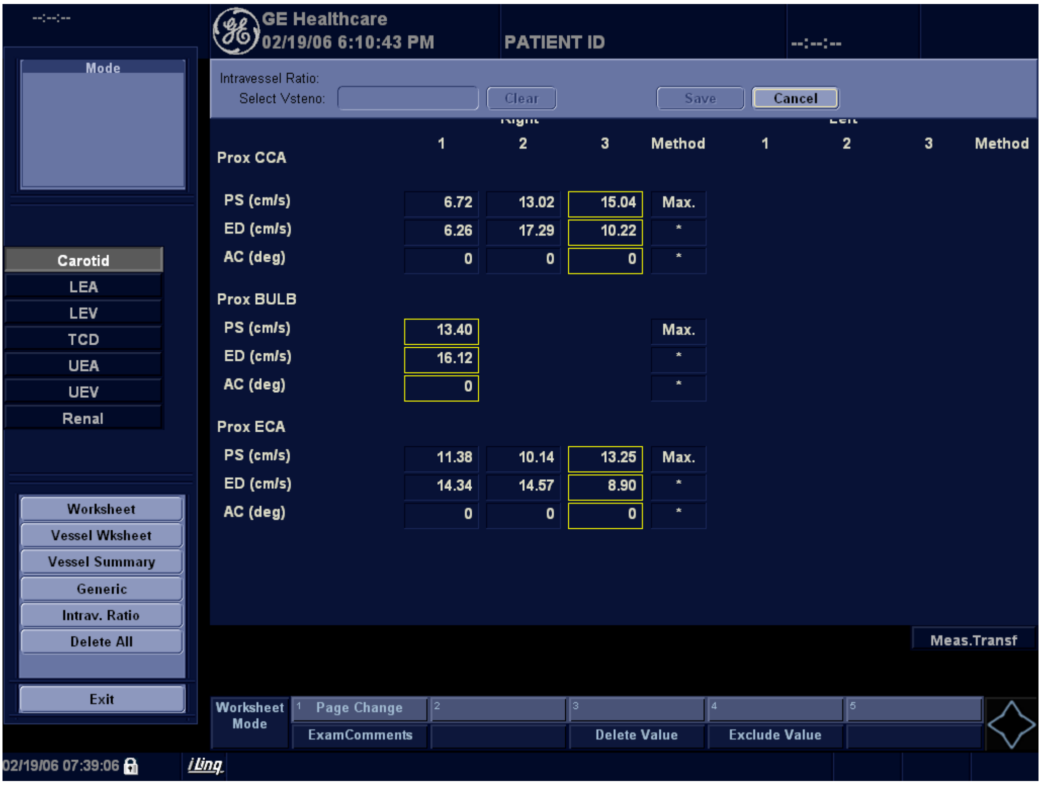
Figure 11-14. Examiner's comment field

NOTE: The Examiner's Comments window can be moved by using the Trackball to move the arrow to the header bar. Press Set. Use the Trackball to move the window.

Intravessel ratio

To calculate Intravessel ratio, you need a measurement of accessing pressure and stenotic velocities.

1. Select ***Intravessel*** to display the pop-up window in the header section of the worksheet.


GE Healthcare
02/19/06 6:10:43 PM
PATIENT ID
--:--:--
Mode
Carotid
LEA
LEV
TCD
UEA
UEV
Renal
Worksheet
Vessel Wksheet
Vessel Summary
Generic
Intrav. Ratio
Delete All
Exit
Clear
Save
Cancel
Meas.Transf
Worksheet Mode
Page Change
ExamComments
Delete Value
Exclude Value
02/19/06 07:39:06
iLinq

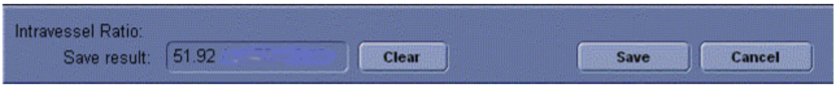
Intravessel Ratio:
Select Vsteno:

	1	2	3	Method	1	2	3	Method
Prox CCA								
PS (cm/s)	6.72	13.02	15.04	Max.				
ED (cm/s)	6.26	17.29	10.22	*				
AC (deg)	0	0	0	*				
Prox BULB								
PS (cm/s)	13.40			Max.				
ED (cm/s)	16.12			*				
AC (deg)	0			*				
Prox ECA								
PS (cm/s)	11.38	10.14	13.25	Max.				
ED (cm/s)	14.34	14.57	8.90	*				
AC (deg)	0	0	0	*				

Figure 11-15. Intravessel Pop-up Window

2. Select the first velocity.

   The value is displayed in the window.


Clear
Save
Cancel

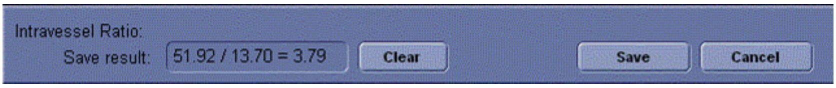
Intravessel Ratio:
Save result: 51.92

Figure 11-16. Intravessel ratio one

Intravessel ratio (continued)

3. Select the second velocity.

   The second value and Result value are displayed in the window.



Intravessel Ratio:

Save result: 51.92 / 13.70 = 3.79

Figure 11-17. Intravessel ratio two

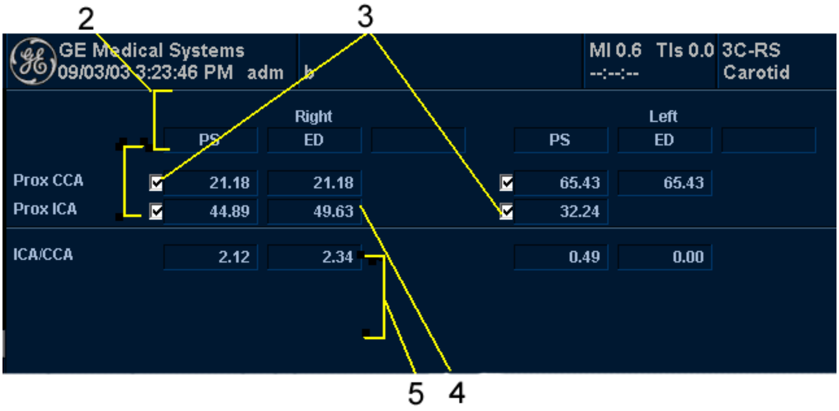
- To save the Intravessel ratio to the Vessel Summary, move the cursor to ***Save*** and press **Set**.
- To clear values, move the cursor to **Clear** and press **Set**.
- To cancel and exit Intravessel ratio, move the cursor to Cancel and press **Set**.

NOTE: Intravessel Ratio is only displayed and saved in the Vessel Summary.

Vessel Summary

The Vessel Summary is designed to automatically display measurements made at specific anatomical sites. Calculated ratios are automatically summarized and displayed.

The Vessel Summary can be displayed at any time during the exam by selecting ***Vessel Summary*** from the Vascular Worksheet Top/Sub Menu.


2
3
GE Medical Systems
09/03/03 3:23:46 PM adm
b
MI 0.6 TIs 0.0 3C-RS
--:--:--
Carotid
5
4

	Right			Left		
	PS	ED		PS	ED	
Prox CCA	☑ 21.18	21.18		☑ 65.43	65.43	
Prox ICA	☑ 44.89	49.63		☑ 32.24		
ICA/CCA	2.12	2.34		0.49	0.00	

Figure 11-18. Vessel Summary Example

Vessel Summary (continued)

1. The first row, indicating Right or Left, is not displayed when the side is not defined in the vessel. In the third column on the second line, you select the calculations. Move the cursor to the third column, and the pop-up menu is displayed as in Figure 11-19. The selected parameter is displayed in every third column.

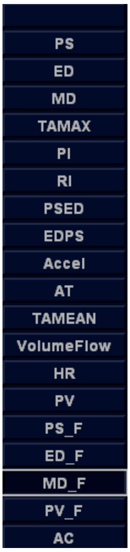


Figure 11-19. Pop-up menu

2. Vessel Name with location information.
3. Check Box. Use to select the vessel velocity for calculating the vessel ratio (ex. ICA/CCA). You can only select one location (position) in a vessel.
4. Result value column. This value cannot be changed or excluded from this page.
5. Calculation name and result. ICA/CCA: The ICA/CCA ratio selects the highest systolic ICA and CCA velocities when calculating this ratio, and displays the velocities.

Carotid Study

In the configuration page for ICA/CCA ratio, you can specify which portion of the CCA vessel (Prox, mid, distal) is chosen. You can override the selections on the Vessel summary.

The ICA/CCA ratio is able to be configured for either systole or diastole.

The vertebral vessel also has systole and diastole selections. In the summary page, there is a box to select flow reversal for vertebral flows. The choices are Ante (Antegrade), Retr (Retrograde), and Abs (Absent).

To select the method:

Move cursor to the box and press **Set**. After the pop-up menu (Blank, Ante, Retr, Abs) is displayed, select from a menu of choices. The selected choice is displayed in the column.

The box is independent of Left and Right.

Renal Artery Study

For renal arteries, you can calculate RENAL/AORTIC ratio (RAR) based on peak systolic velocities.

You can combine the two renal summary pages, and have a heading to separate the different measurements (main renal, intra renal). You can scroll between the content. The most commonly used, the main renal artery, is the default.

Lower Extremity Artery Study

For the lower extremity artery, you need an intra vessel ratio (assessing pre vs. stenotic velocities). You can specify which (ratio is stenotic/pre).

The intra-vessel ratio needs to be available for all vascular measurements. This appears on the worksheet only if used.

Recording Worksheet

The worksheet can be saved as you would any ultrasound image. Once it is displayed on the screen, it can be printed on the B/W or color page printer, stored on media with the Image Archive option, or placed on regular paper with a line printer.

Chapter 12

Urology

Describes how to perform Urology measurements and calculations.

Urology Exam Preparation

Introduction

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements is not only determined by the system accuracy, but also by use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigators are so noted. Be sure to refer to the original article describing the investigator's recommended clinical procedures.

General Guidelines

New Patient information must be entered before beginning an exam. See ‘Beginning an Exam’ on *page 4-2 for more information.*

Any measurement can be repeated by selecting that measurement again from the Top/Sub Menu Menu.

The system retains as many as eight measurements, but the worksheet retains only the last six measurements of each type.

Urology Calculations

Introduction

Urology measurements offer two different types of measurement studies:

- Generic–Common to all applications. See ‘Generic Measurements’ on *page 7-67 for more information.*
- Urology
  - This chapter describes Urology B-Mode measurements.
  - The Urology M-Mode measurements are common to other applications. See ‘M-Mode Measurements’ on *page 7-77 for more information.*
  - The Urology Doppler measurements are common to other applications. See ‘Doppler Mode Measurements’ on *page 7-80 for more information.*

To change a study:

1. Press ***Exam Calcs***.

   The Urology exam category allows you to choose from the displayed studies.
2. To select another study, select the desired study folder.

Urology B-Mode Measurements

In B-Mode, the Generic Exam Calcs for Urology includes the following measurements:

- % Stenosis
- Volume
- Angle
- A/B Ratio

See ‘B-Mode Measurements’ on *page 7-68 for more information.*

The following measurements are located specifically in the Urology Exam Calcs. Those specific measurements (Bladder Volume, Prostate Volume and Renal Volume) are listed on the following pages.

Select the Urology Exam Calcs. The following Top/Sub Menu is displayed.

Urology B-Mode Measurements (continued)

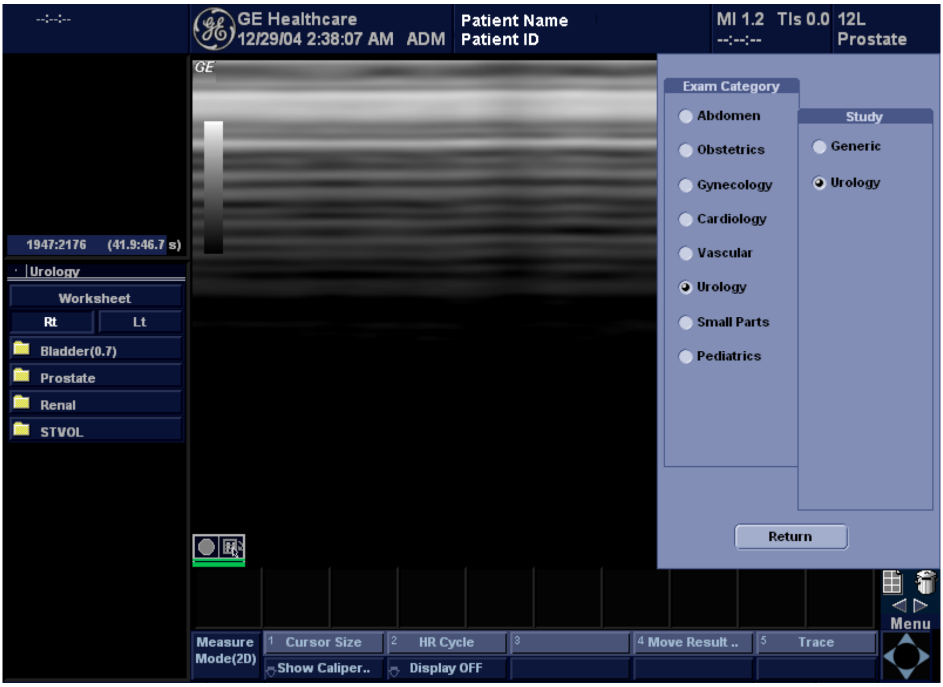
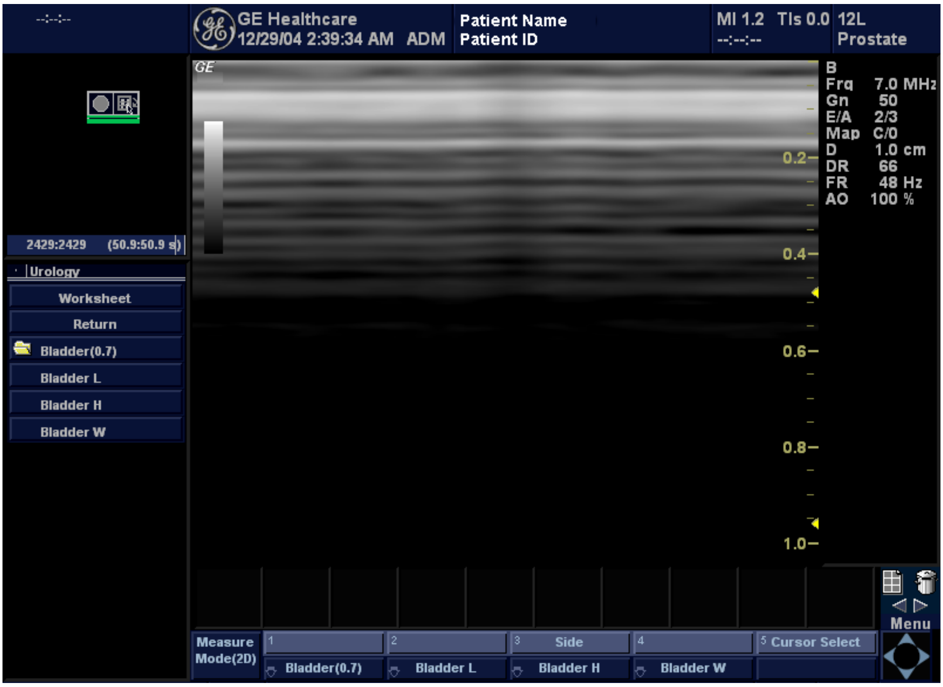

--:--:--
GE Healthcare
12/29/04 2:38:07 AM ADM
Patient Name
Patient ID
MI 1.2 TIs 0.0
12L
Prostate
GE
1947:2176 (41.9:46.7 s)
Urology
Worksheet
Rt
Lt
Bladder(0.7)
Prostate
Renal
STVOL
Exam Category
○ Abdomen
○ Obstetrics
○ Gynecology
○ Cardiology
○ Vascular
● Urology
○ Small Parts
○ Pediatrics
Study
○ Generic
● Urology
Return
Menu
Measure Mode(2D)
1 Cursor Size
Show Caliper..
2 HR Cycle
Display OFF
3
4 Move Result ..
5 Trace

Figure 12-1. Urology Exam Calcs B-Mode Top/Sub Menu

NOTE: *Bladder, Prostate Vol, Renal Vol and Bladder Vol can be displayed on the Top/Sub Menu if preset at the Utility -> Measure screen.*

Bladder Volume

This calculation uses a standard distance measurement. Length is typically measured in the sagittal plane. Width and height are measured in the axial plane.



GE Healthcare
12/29/04 2:39:34 AM ADM
Patient Name
Patient ID
MI 1.2 TIs 0.0 12L
Prostate

B
Frq 7.0 MHz
Gn 50
E/A 2/3
Map C/0
D 1.0 cm
DR 66
FR 48 Hz
AO 100 %

--:--:--
GE
2429:2429 (50.9:50.9 s)
Urology
Worksheet
Return
Bladder(0.7)
Bladder L
Bladder H
Bladder W
0.2
0.4
0.6
0.8
1.0
Menu
Measure Mode(2D)
1
2
3 Side
4
5 Cursor Select
Bladder(0.7)
Bladder L
Bladder H
Bladder W

Figure 12-2. Bladder Volume Top/Sub Menu

To measure Bladder Volume:

1. Scan the patient in the appropriate scan plane.
2. Select the ***Bladder*** folder, an active caliper displays.
3. Perform a standard distance measurement.

   The system displays the distance value in the Results Window.
4. To make the second and third distance measurement, repeat steps 2–3.

   After you complete the third distance measurement, the system displays the bladder volume in the Results Window.

Prostate Volume

This calculation uses a standard distance measurement. Length is typically measured in the sagittal plane. Width and height are measured in the axial plane.

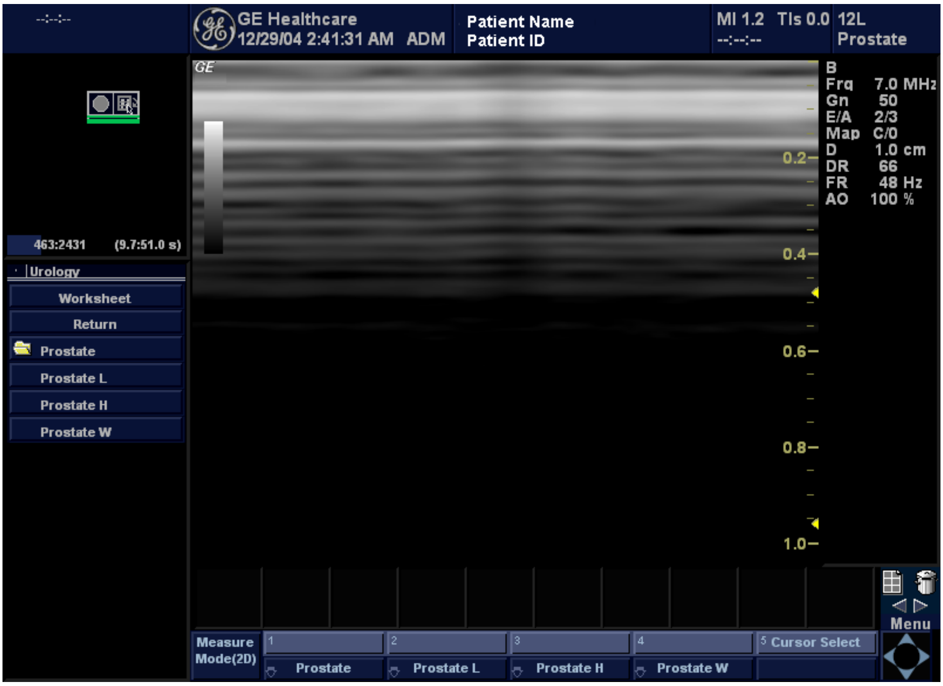

GE Healthcare
12/29/04 2:41:31 AM ADM
Patient Name
Patient ID
MI 1.2 TIs 0.0 12L
Prostate
B
Frq 7.0 MHz
Gn 50
E/A 2/3
Map C/0
D 1.0 cm
DR 66
FR 48 Hz
AO 100 %
463:2431 (9.7:51.0 s)
Urology
Worksheet
Return
Prostate
Prostate L
Prostate H
Prostate W
0.2
0.4
0.6
0.8
1.0
Measure Mode(2D)
Cursor Select
Menu

Figure 12-3. Prostate Volume Top/Sub Menu

To measure Prostate Volume:

1. Scan the patient in the appropriate scan plane.
2. Select the ***Prostate*** folder, an active caliper displays.
3. Perform a standard distance measurement.

   The system displays the distance value in the Results Window.
4. To make the second and third distance measurement, repeat steps 2–3.

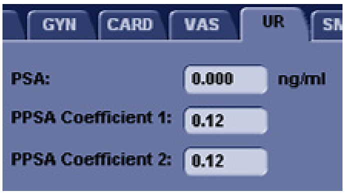
   After you complete the third distance measurement, the system displays the prostate volume in the Results Window.

Prostate Volume (continued)

PSA Measurement

If you enter the value of PSA (Prostatic Specific Antigen) and PPSA Coefficient at the Urology Patient screen, PSAD and PPSA are automatically calculated.

The values are displayed on the Worksheet.

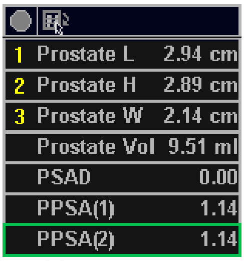


PSA: 0.000 ng/ml

PPSA Coefficient 1: 0.12

PPSA Coefficient 2: 0.12

Figure 12-4. Urology Patient Screen



1	Prostate L	2.94 cm
2	Prostate H	2.89 cm
3	Prostate W	2.14 cm
	Prostate Vol	9.51 ml
	PSAD	0.00
	PPSA(1)	1.14
	PPSA(2)	1.14

Figure 12-5. Measurement result window

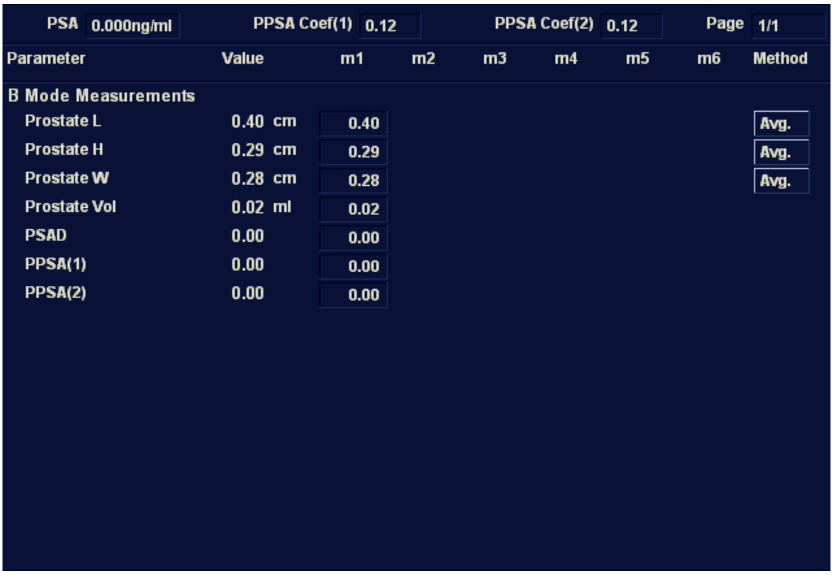
PSAD: Prostatic Specific Antigen (PSA) Density – defined as: PSAD = PSA/Volume

PPSA: Predicted Prostate Specific Antigen – defined as: PPSA = Volume x PPSA Coefficient

Prostate Volume (continued)

Worksheet

- For the prostate volume calculation, you can select the method “m1”, “m2” or “m3” in addition to Avg., Max., Min. and Last.
- The value of PSA and PPSA are displayed.



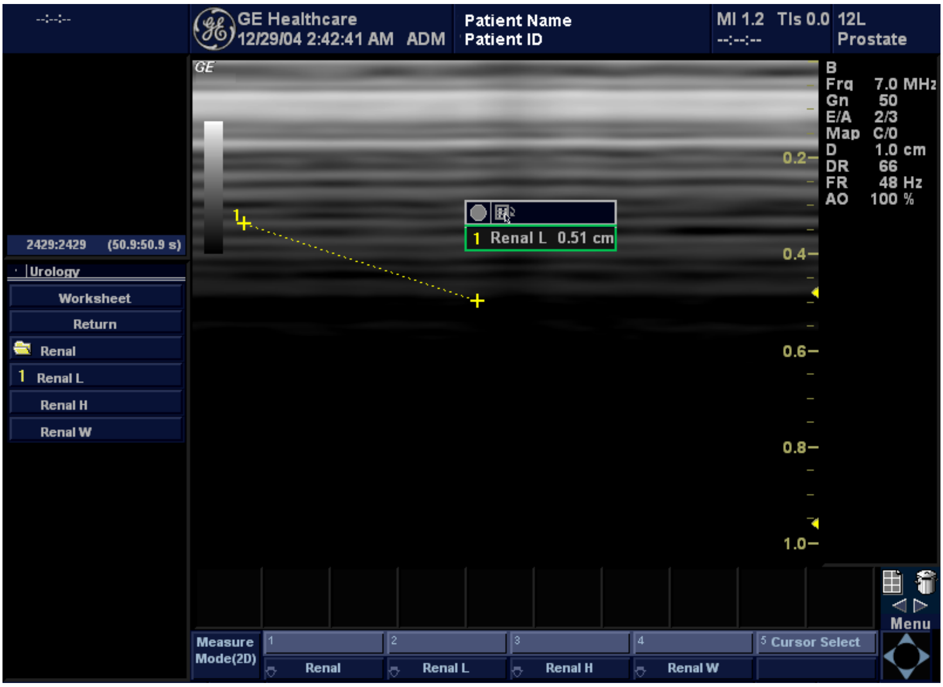
PSA 0.000ng/ml PPSA Coef(1) 0.12 PPSA Coef(2) 0.12 Page 1/1

Parameter	Value	m1	m2	m3	m4	m5	m6	Method
B Mode Measurements								
Prostate L	0.40 cm	0.40						Avg.
Prostate H	0.29 cm	0.29						Avg.
Prostate W	0.28 cm	0.28						Avg.
Prostate Vol	0.02 ml	0.02						
PSAD	0.00	0.00						
PPSA(1)	0.00	0.00						
PPSA(2)	0.00	0.00						

Figure 12-6. Urology Worksheet

Renal Volume

This calculation uses a standard distance measurement. Length is typically measured in the sagittal plane. Width and height are measured in the axial plane.



GE Healthcare
12/29/04 2:42:41 AM ADM
Patient Name
Patient ID
MI 1.2 TIs 0.0 12L
Prostate

B
Frq 7.0 MHz
Gn 50
E/A 2/3
Map C/0
D 1.0 cm
DR 66
FR 48 Hz
AO 100 %

1 Renal L 0.51 cm

--:--:--
--:--:--
GE
2429:2429 (50.9:50.9 s)
Urology
Worksheet
Return
Renal
1 Renal L
Renal H
Renal W
0.2
0.4
0.6
0.8
1.0
Menu
Measure Mode(2D)
1 Renal
2 Renal L
3 Renal H
4 Renal W
5 Cursor Select

Figure 12-7. Renal Volume Top/Sub Menu

To measure Renal Volume:

1. Scan the patient in the appropriate scan plane.
2. Select the ***Renal*** folder, an active caliper displays.
3. Perform a standard distance measurement:

   The system displays the distance value in the Results Window.
4. To make the second and third distance measurement, repeat steps 2–3.

   After you complete the third distance measurement, the system displays the renal volume in the Results Window.

Chapter 13

Pediatrics

Describes how to perform Pediatrics measurements and calculations.

Pediatrics Exam Preparation

Introduction

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements is not only determined by the system accuracy, but also by use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigators are so noted. Be sure to refer to the original article describing the investigator's recommended clinical procedures.

General Guidelines

New Patient information must be entered before beginning an exam. See ‘Beginning an Exam’ on *page 4-2 for more information.*

Any measurement can be repeated by selecting that measurement again from the Top/Sub Menu.

The system retains as many as eight measurements, but the worksheet retains only the last six measurements of each type.

The six worksheet measurements can be averaged and the average used in other calculations.

Pediatrics Calculations

Overview

Pediatrics measurements offer two different types of measurement studies:

- Generic. The Generic Calculations study is common to all applications. See ‘Generic Measurements’ on *page 7-67 for more information.*
- Pediatric Hip (PedHip).
  - This chapter describes Pediatrics B-Mode measurements.
  - The Pediatrics M-Mode measurements are common to other applications. See ‘M-Mode Measurements’ on *page 7-77 for more information.*
  - The Pediatrics Doppler measurements are common to other applications. See ‘Doppler Mode Measurements’ on *page 7-80 for more information.*

Pediatrics

B-Mode Measurements

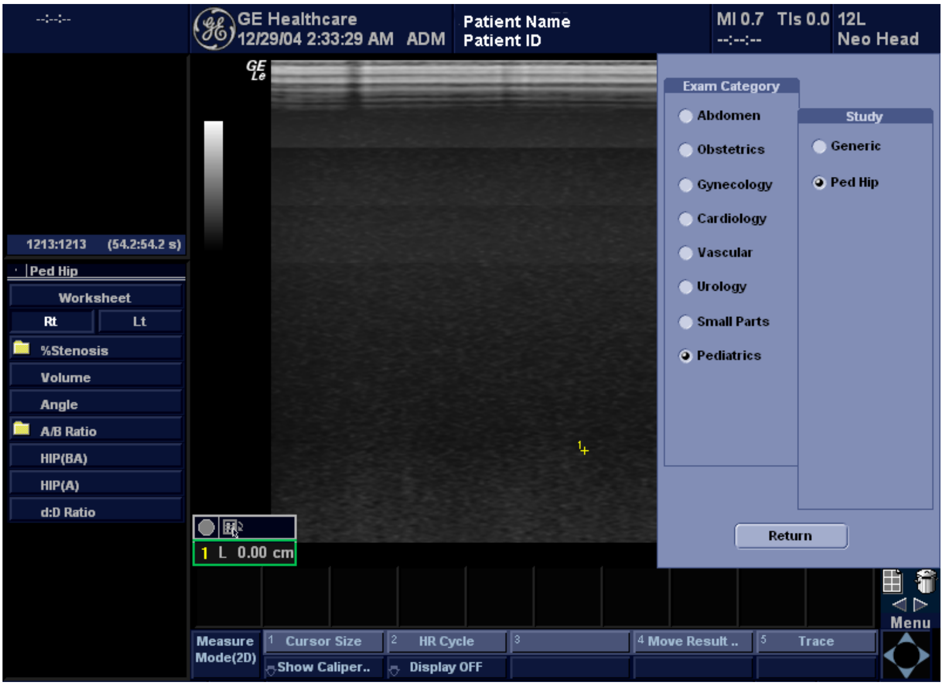

--:--:--
GE Healthcare
12/29/04 2:33:29 AM ADM
Patient Name
Patient ID
MI 0.7 TIs 0.0 12L
--:--:--
Neo Head
1213:1213 (54.2:54.2 s)
Ped Hip
Worksheet
Rt
Lt
%Stenosis
Volume
Angle
A/B Ratio
HIP(BA)
HIP(A)
d:D Ratio
1 L 0.00 cm
Exam Category
Abdomen
Obstetrics
Gynecology
Cardiology
Vascular
Urology
Small Parts
Pediatrics
Study
Generic
Ped Hip
Return
Menu
Measure Mode(2D)
Cursor Size
Show Caliper..
HR Cycle
Display OFF
Move Result ..
Trace

Figure 13-1. Pediatrics B-Mode Measurement Top/Sub Menu

The following generic measurements are common to other exam applications:

- %Stenosis
- Volume
- Angle
- A/B Ratio

See ‘B-Mode Measurements’ on *page 7-68 for more information.*

B-Mode Measurements (continued)

Hip Dysplasia Measurement

The HIP calculation assists in assessing the development of the infant hip. In this calculation, three straight lines are superimposed on the image and aligned with the anatomical features. The two angles are computed, displayed, and can be used by the physician in making a diagnosis.

The three lines are:[1]

1. The baseline connects the osseous acetabulum convexity to the point where the joint capsule and the perichondrium unite with the iliac bone.
2. The inclination line connects the osseous convexity to labrum acetabulare.
3. The Acetabulum roof line connects the lower edge of the osilium to the osseous convexity.

The α (Alpha) angle is the supplement of the angle between 1 and 3. It characterizes the osseous convexity. The β (Beta) angle is the angle between lines 1 and 2. It characterizes the bone supplementing additional roofing by the cartilaginous convexity.

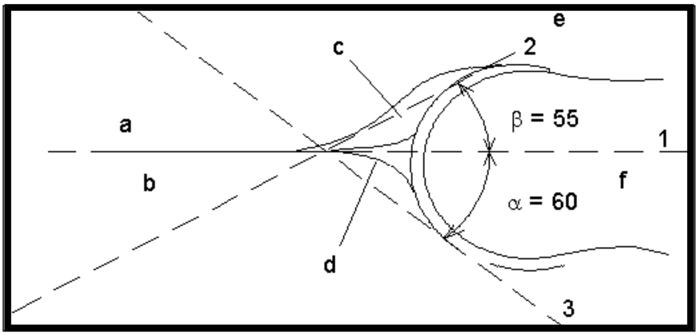


Figure 13-2. Hip Dysplasia

Anatomical Landmarks	
a. Ilium	d. Bony Roof
b. Iliac Bone	e. Cartilaginous acetabular roof
c. Labrum	f. Femoral Head

[1] Source: R GRAF, journal of Pediatric Orthopedics, 4: 735-740(1984)

B-Mode Measurements (continued)

Hip Dysplasia Measurement (continued)

To make a Hip Dysplasia measurement:

1. From the Top/Sub Menu, select either the ***right*** or ***left side*** (orientation) and then select ***HIP***.

   A horizontal dotted line displays.
2. To place the baseline, move the ***Trackball***. Position the crosshairs edge at the osseous convexity of the ilium.
3. To rotate or change inclination, adjust the **Ellipse** control or ***Hip Rotate***.
4. To fix the baseline, press ***Set***.

   The system displays a second dotted line at an angle.
5. To place the line along the inclination line of the osseous convexity to labrum acetabulare, move the ***Trackball***.
6. To rotate or change inclination, adjust the **Ellipse** control or ***Hip Rotate***.
7. To fix the second measurement line, press ***Set***.

   The system displays a third dotted line at an angle.
8. To place the caliper along the acetabular roof line, move the ***Trackball***.
9. To rotate or change inclination, adjust the **Ellipse** control or ***Hip Rotate***.
10. To fix the third measurement line and complete measurement, press ***Set***.

    The system displays the hip measurements (α and β) in the Results Window.

B-Mode Measurements (continued)

Alpha HIP The Alpha HIP measurement measures the angle between the iliac baseline and the bony roof line. To make an Alpha HIP measurement:

1. From the Top/Sub Menu, select either the ***right*** or ***left side*** (orientation) and then select ***Alpha HIP***.

   A horizontal dotted line displays.
2. To place the baseline, move the ***Trackball***. Position the crosshairs edge at the osseous convexity of the ilium.
3. To rotate or change inclination, adjust the **Ellipse** control or ***Hip Rotate***.
4. To fix the baseline, press ***Set***.

   The system displays a second dotted line at an angle.
5. To place the caliper along the acetabular roof line, move the ***Trackball***.
6. To rotate or change inclination, adjust the **Ellipse** control or ***Hip Rotate***.
7. To fix the second measurement line, press ***Set***.

   The system displays the alpha hip measurement (α) in the Results Window.

B-Mode Measurements (continued)

d:D Ratio Measurement

The d:D Ratio measurement measures the percentage of the femoral head coverage under the bony roof. To make this measurement:

1. From the Top/Sub Menu, select either the ***right*** or ***left side*** (orientation) and then select **d:D Ratio**.

   A horizontal dotted line displays.
2. Use the ***Trackball*** to place the baseline along the ilium. Position the crosshairs edge at the osseous convexity of the ilium.
3. Use the **Ellipse** control to adjust or change inclination or ***Hip Rotate***.
4. Press ***Set*** to fix the baseline.
5. The system displays a circle representing the femoral head. Use the ***Trackball*** to position the circle.
6. Use the **Ellipse** control to size the femoral head circumference.
7. Press ***Set*** to fix the femoral head circumference.

   The system displays the d:D ratio for the femoral head in the Results Window.

Chapter 14

ReportWriter

Describes how to generate reports.

This feature is not available at this time.

Chapter 15

Recording Images

Describes how to record images.

Getting Set Up to Record Images

Overview

A typical workflow for connectivity might be as follows (this setup varies by each user setup):

- Select the dataflow, worklist for example.
- Start a new exam. Select the patient.
- Perform the patient scan.
- Store images as multi-frame CINE Loops and Raw DICOM data via the P1 button.
- Store secondary capture for DICOM print via P2.
- Store images to the USB Memory Stick directly via P3.
- Check the DICOM Job Spooler via F4 to verify delivery.
- End the exam.
- Permanently store images via the Patient menu.

⚠ WARNING

Imaging functions may be lost without warning. Develop emergency procedures to prepare for such an occurrence.

Overview (continued)

Dataflow combines archive, data, DICOM, and onboard records into one coherent workflow. Destination devices are configured and assigned to the print buttons. You select the appropriate dataflow (Portable, etc.) according to your requirements. You manage the patient database (local, shared, or via a worklist broker).

- DO NOT use the internal hard drive for long-term image storage. Daily backup is recommended. External storage media is recommended for image archive.

NOTE: *DICOM images are stored to external media storage devices separately from patient data, which also needs to be backed up to a dedicated database-formatted external storage media.*

- You need to set up a protocol for locating images stored to external storage media for easy recall
- GE Medical Systems IS NOT responsible for lost data if you do not follow suggested back-up procedures. GE Medical systems WILL NOT aid in the recovery of lost data.

Refer to the Customizing Your System chapter for instructions on seting up your system's connectivity.

Adding Devices

To add a destination device (printer, worklist server, etc.) to this system, see Chapter 16.

To verify a DICOM device, see Chapter 16.

Adding a Dataflow

To add a new dataflow to this system, see Chapter 16.

Adding Devices to a Print Button

To add devices/dataflows to a print button, see Chapter 16.

Formatting Removable Media

To format removable media, see Chapter 16.

Using the DICOM Spooler

To monitor/control DICOM jobs, press F4. You can view, resend, redirect, and delete images from the DICOM spooler by selecting a job, then specifying the action to be performed on this job.

Table 15-1: Spooler status description

Status	Description
Hold	Waiting for user activity. Select Resend or Send-To to complete the job.
Pending	Waiting for the previous job(s) to finish (a previous job may be Active or Pending). No user interaction required.
Append	Not completed. Example 1: Direct Storing job. Waiting for more images or the end of the exam (by selecting New Patient or End Current Patient). Example 2: Print job with 3x3 images has only 8 images. Waiting for one more image or the end of the exam (by selecting New Patient or End Current Patient).
Active	Signifies network activity (or connection attempt).
Success	Sent successfully.
Failed	Unsuccessful job attempt. Job stays in spooler. Select Retry or Delete to complete the job.
Done	Finished successfully.

Troubleshooting

To troubleshoot connectivity on this system, see Chapter 16.

To verify that a service is connected to the network, see Chapter 16.

Image/Data Management

Reviewing Patient Images

Please refer to Chapter 4 for more information on the following:

- Retrieving and editing archived information
    - Searching for a patient
    - Reviewing a patient exam
    - Reviewing an image
    - Deleting a patient, exam, or image

Clipboard

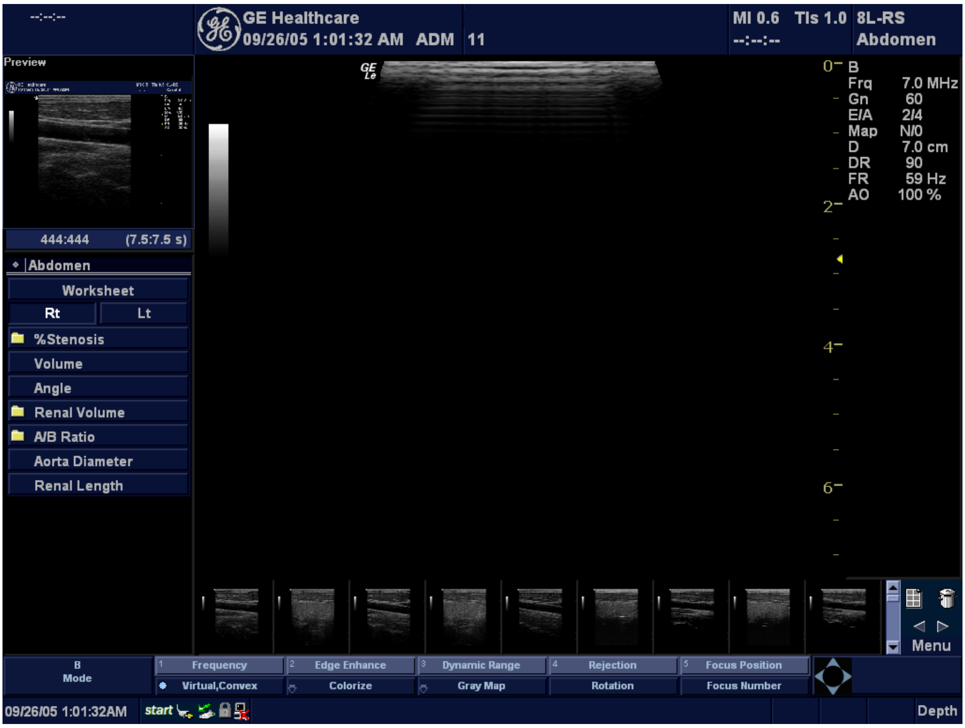
The clipboard displays thumbnail images of the acquired data for the current exam. Images from other exams are not displayed on the current patient's clipboard.

The active image is stored and placed on the clipboard when you press the print key (this assumes that you have already set up a print key to do this). The clipboard contains preview images with enough resolution to clearly indicate the contents of the image. If an image has a triangle indicator on the lower, left-hand corner, then something has been done to the image (printed, sent to DICOM, etc.). Single images are indicated by a '1'; CINE Loops have no special identifier.

The clipboard fills from left to right, starting on the left. Once the row is full (12 images), the next image stored starts to fill a 'second' row (the first row disappears from the clipboard display, with the second row now becoming the first row).

Clipboard (continued)

All of the images can be viewed in the Active Images screen or in the Analyze screen, available from the display or from the New Patient menu.



GE Healthcare
09/26/05 1:01:32 AM ADM 11
MI 0.6 TIs 1.0 8L-RS
Abdomen

B
Frq 7.0 MHz
Gn 60
E/A 2/4
Map N/0
D 7.0 cm
DR 90
FR 59 Hz
AO 100 %

444:444 (7.5:7.5 s)

09/26/05 1:01:32AM

--:--:--
Preview
0
2
4
6
Abdomen
Worksheet
Rt
Lt
%Stenosis
Volume
Angle
Renal Volume
A/B Ratio
Aorta Diameter
Renal Length
Menu
B Mode
1 Frequency
2 Edge Enhance
3 Dynamic Range
4 Rejection
5 Focus Position
Virtual,Convex
Colorize
Gray Map
Rotation
Focus Number
start
Depth

Figure 15-1. Clipboard

Previewing Clipboard Images

1. Select the **Cursor** key (opposite the **Set** key) to obtain a cursor arrow.
2. Move the **Trackball** to position the pointer over the clipboard image you want to recall.
3. An enlarged preview of the image is displayed on the left-hand side of the monitor.

Recalling Images from the Clipboard

To recall images from the clipboard,

1. Select the **Cursor** key (opposite the **Set** key) to obtain a cursor arrow.
2. Move the **Trackball** to position the pointer over the clipboard image you want to recall.
3. Press **Set** to recall the image.

Storing an Image

To store an image,

1. While scanning, press Freeze.
2. Scroll through the CINE Loop and select the desired image.
3. Press the appropriate Print key.

The selected image is stored (per your preset instructions) and a thumbnail is displayed on the clipboard.

Storing a CINE Loop

A CINE Loop is a sequence of images recorded over a certain timeframe. The stored CINE Loops are displayed chronologically on the clipboard.

CINE Loops can be stored at any time during scanning. You can choose to preview the CINE Loop before storage and save the CINE Loop directly, as described below.

Previewing and Storing a CINE Loop

1. While scanning, press Freeze.
2. Determine the best CINE Loop to store.
3. Play the CINE Loop to review it.
4. Press the appropriate Print key.

Depending on whether the system has been configured to enable or disable “Preview Loop before store” (see Chapter 16), the following procedures enable the CINE Loop to be stored directly.

Storing a CINE Loop Without Preview

If “Preview Loop before store” is disabled,

1. While scanning, press the appropriate Print key.
2. The last valid CINE Loop is stored in the archive and a thumbnail is displayed on the clipboard.

Storing a CINE Loop With Preview

If “Preview Loop before store” is enabled,

1. While scanning, press the appropriate Print key.
2. The last valid CINE Loop is previewed.
3. Adjust the CINE Loop, as necessary.
4. Press the appropriate Print key.

   The thumbnail is displayed on the clipboard.

Using the Monitor Display Controls to Manage Images

You can also manage images from the display. In the lower, right-hand corner of the monitor display, there are four menu icons: Active Images (1), Delete (2), Previous/Next Clipboard Image (3), and Menu (4).

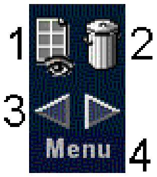


Figure 15-2. Menu Icons

Active Images Page

Press Active Images Page to go to the Patient Active Images page.

Analyzing Images

To review archived images, select the image, then select Review. The archived images is displayed with the date and time of archival.

To compare the analyzed image to a live image, press L / R. Now both the archived and live images appear on the monitor display. Unfreeze the live image area.

Viewing Two Different Studies from the Same Patient

To view images side-by-side from two different studies on the same patient,

1. Select the patient.
2. Go to the Image History page.
3. Select the first image.
4. Select the next image from the other exam.
5. Press ***Review***

Using the Monitor Display Controls to Manage Images (continued)

Delete (Trash Can)

You can use this to delete an image from the clipboard.

1. Place the cursor on the clipboard image you want to delete, then press **Set** to select the image.
2. Place the cursor on the Delete icon and press **Set**.

Previous/Next Clipboard Image

Press the left arrow to move to the previous image; press the right arrow to move to the next image.

Menu

Place the cursor on Menu and press Set. Select from the following:

- Save As
- Image Properties
- Cancel

Save As: Save the image as a RawDicom (.dcm), Dicom (.dcm), Avi (.avi), Jpeg (.jpg), or SR format. To save an image as a specific format,

1. Select the media.
2. Select the save as format (.dcm, .avi, .jpg, or SR).
3. Name the image.

NOTE: *Image only saves the image screen; secondary capture saves the entire screen.*

Image Management Guide

Save As to View on any PC	Use this to save images in a computer-friendly format so you can view it on any PC.
EZBackup/Move Images to Archive	Use this to take images off your Ultrasound system onto removable media for long-term archive. This is the way to free up hard disk space, rather than deleting images.
Export/Import Data/Images Between Systems	Use this to copy both patient data and images for specified patient(s) from one system to another.

Media Requirements

Only use CD-R CD-ROMs and DVD-R DVDs, DO NOT use CD-RW CD-ROMs or DVD-RAM or DVD+R or mini discs. Also, the CD-R CD-ROM MUST support 16x writing speed or greater.

Media Handling Tips

To eject the media, always press ***F3***. **DO NOT** press the eject button on the drive.

Always finalize the media. This allows you to read them on any other PC.

DO NOT finalize the media if you want to add more images.

Save As (Saving Images to the media to View on a Windows PC)

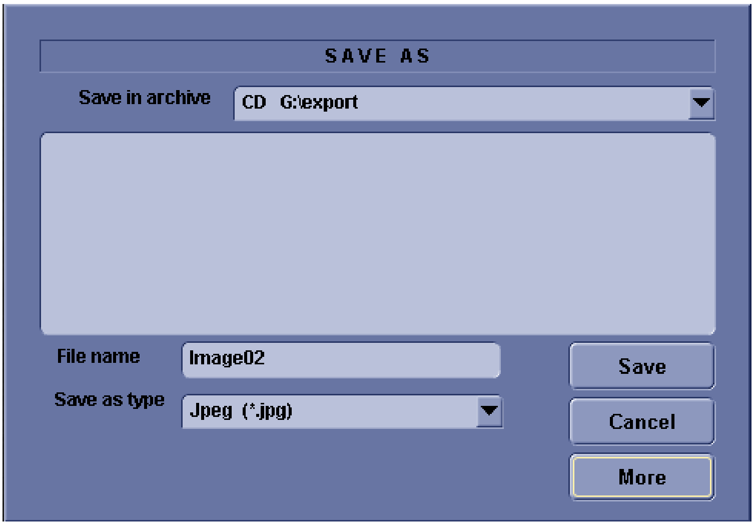
To save images to the media:

NOTE: ALWAYS format the media PRIOR to saving data.

1. Format the media: Insert the media. Go to Utility --> Connectivity --> Removable Media. Select the Media. Label the media. Press Format to format the media.
2. On the scan screen, press the left Set key. The arrow cursor displays.
3. Place the cursor on the image or CINE Loop in the clipboard to be saved and press Set. The image displays on the screen.
4. Select Menu in the lower, right-hand corner of the screen. The system menu displays.

NOTE: If you save the image as an .avi file, run the CINE Loop before you select Menu.

5. Select Save As. The SAVE AS menu appears.



SAVE AS

Save in archive: CD G:\export

File name: Image02

Save as type: Jpeg (*.jpg)

Figure 15-3. Save As Menu

HINTS

DO NOT use the following special characters when saving images: slash (/), dash (-), or asterisk (*).

Save As (Saving Images to the media to View on a Windows PC) (continued)

6. Save in archive: Select the media.
7. File name: Type the file name.

NOTE: If you select to save as DICOM or RawDICOM, the file name is automatically generated to follow the DICOM standard.

8. Store: Select Image only or Secondary capture.
    - Image only: Saves only the ultrasound image area
    - Secondary capture: Saves the ultrasound image area, title bar, and scan information area. Not available for DICOM or RawDICOM images.
9. Compression: Specify Compression.
10. Quality: Specify image quality (between 10-100). A high quality setting gives a lower compression.
11. Save as type: Select one of the following.
    - RawDICOM: saves the still image or CINE Loop in both GE raw format and DICOM format.
    - DICOM: saves the still image or CINE Loop in pure DICOM format.
    - AVI: Saves the CINE Loop in avi format.
    - JPEG: Saves the still image in jpeg format.
12. Press Save.
13. When you have put all the images you want on the media, press ***F3*** to eject the media.

Save As (Saving Images to the media to View on a Windows PC) (continued)

14. Specify whether you want to finalize the media. Finalize the media by selecting Yes. If you want to add more images to the media, select No. The media is then ejected from the system.

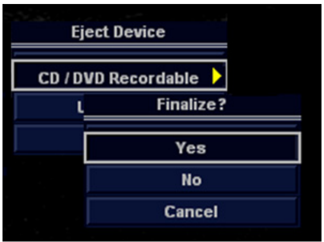


Figure 15-4. Finalize CD-ROM Menu

NOTE: ***Save As: To CD/DVD*** *- When saving an image(s) from the clipboard to CD/DVD, select 'For Transfer to CD/DVD'. When you select 'Save,' the image(s) are moved to a temporary directory. You can then select to either clear the temporary directory ('Delete Files for Transfer') or to transfer the contents of this temporary directory to CD/DVD ('Transfer to CD/DVD').*

Storing Images with More Resolution

To store images with more resolution than is available with the JPEG selection, select Save As and select AVI as the Save As Type. You can save single images as .avi files.

Table 15-2: Store Options

Image Type	Store as Image Only	Store as Secondary Capture
CINE Loop	Gives you a loop of just the image (no title bar and scan information).	Gives you a single image of the video area. DO NOT DO THIS BECAUSE YOU DO NOT KNOW WHICH IMAGE FROM THE LOOP THAT YOU ARE GETTING.
Still Image	Gives you a single image (no title bar and scan information).	Gives you a single image of the video area.

USB Flash Drive

The USB Flash Drive is an ESD-sensitive device. GE only supports the Kingston 512M USB Flash Drive.

CAUTION

Before removing the USB Flash Drive from the USB port, press Eject (F3) and select USB Drive from the pull-down menu to disconnect the USB Flash Drive.

MPEGvue (Data Transfer)

To transfer a patient/exam to the USB Flash Drive,

1. Insert the USB Flash Drive into the USB port on the left side.
2. On the Patient menu, select Data Transfer, then MPEGvue. Specify USB Drive in the transfer To: pull-down menu. Select the patient/exam you want to transfer. Press Transfer.
3. When the transfer has been completed, press ***Eject (F3)***. Select USB Drive from the pull-down menu to disconnect the USB Flash Drive.
4. Remove the USB Flash Drive from the USB port.

CAUTION

DO NOT use MPEGvue for diagnostic purposes. MPEGvue only transfers exams with images; exams without images are not transferred.

Save As (Saving Images to the USB Flash Drive)

To save images to the USB Flash Drive,

1. Insert the USB Flash Drive into the USB port on the left side.
2. Select the image(s) to be saved.
3. Press Menu in the lower, right-hand corner of the screen. Select Save As. Select the USB Drive as the archive media.
4. Specify: Image only or Secondary Capture, type of compression, quality, and image save format (Raw Dicom, Dicom, Avi, Jpeg, or SR).
5. Press Save. When the images have been saved, press ***Eject (F3)***. Select USB Drive from the pull-down menu to disconnect the USB Flash Drive.
6. Remove the USB Flash Drive from the USB port.

Backup/Restore

To Backup/Restore to/from a USB Flash Drive,

1. Insert the USB Flash Drive into the USB port on the left side.
2. Press Utility--> Backup/Restore. Select the USB Drive as the media.
3. Follow instructions for Backup/Restore in Chapter 16.
4. When the backup/restore have been completed, press ***Eject (F3)***. Select USB Drive from the pull-down menu to disconnect the USB Flash Drive.
5. Remove the USB Flash Drive from the USB port.

Formatting the USB Flash Drive

To format the USB Flash Drive

1. Insert the USB Flash Drive into the USB port on the left side.
2. Select Utility--> Connectivity--> Removable Media.
3. Select USB Drive from the Removable Media pull-down menu.
4. Type the USB Flash Drive label.
5. Press Format.

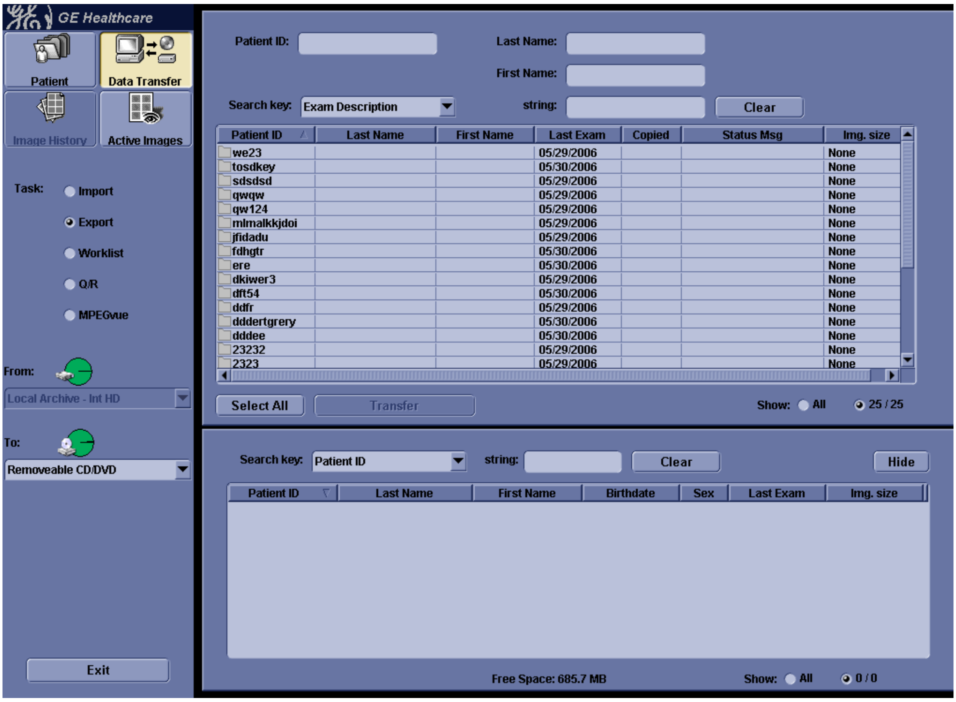
EZBackup/EZMove

Please refer to Chapter 16 for instructions on how to configure and use EZBackup/EZMove.

Data Transfer

The user can select and access the 5 Exam Transfer services from the Exam Data Transfer screen.

- Import
- Export
- Worklist
- Q/R (Query/Retrieve)
- MPEGvue



Task:
○ Import
● Export
○ Worklist
○ Q/R
○ MPEGvue

From: Local Archive - Int HD

To: Removeable CD/DVD

Patient ID:
Last Name:
First Name:
Search key: Exam Description
string:

Patient ID	Last Name	First Name	Last Exam	Copied	Status Msg	Img. size
we23			05/29/2006			None
tosdkey			05/30/2006			None
sdsdsd			05/29/2006			None
qwqw			05/29/2006			None
qw124			05/29/2006			None
mlmalkkjdoi			05/29/2006			None
jfidadu			05/29/2006			None
fdhgtr			05/30/2006			None
ere			05/30/2006			None
dkiwer3			05/29/2006			None
dft54			05/30/2006			None
ddfr			05/29/2006			None
dddertgrery			05/30/2006			None
dddee			05/30/2006			None
23232			05/29/2006			None
2323			05/29/2006			None

Show: ○ All ● 25 / 25

Search key: Patient ID
string:

Patient ID	Last Name	First Name	Birthdate	Sex	Last Exam	Img. size

Free Space: 685.7 MB

Show: ○ All ● 0 / 0

Figure 15-5. Exam Data Transfer Screen

Export/Import (Moving Data Between Systems or Back Up/Retrieve data)

To move exams from one Ultrasound system to another system or to back up/retrieve exam information, you need to export/ import exam information.

NOTE: Both database information and images are exported. No data is deleted from the local archive when exporting data.

NOTE: Export/Import patient records may take more than ten (10) minutes. Please allow sufficient time to export/import patients.

NOTE: If you use a DVD for Export/Import, select Removable CD Archive.

NOTE: You MUST verify the media you use BEFORE performing Export/Import. You must do this once each session. If you encounter problems, eject the media and then re-insert the media; then try the Export/Import again.

NOTE: You cannot export locked images. If an image that you want to export appears locked, reselect the patient, then export the exam OR select “Unlock All” at Utility -> Admin -> Logon.

Exporting Data

To export an exam(s) to a compatible Ultrasound system:

1. Format and label the removable media. Answer Yes/OK to the messages.
2. Press **Patient** and select ***Data Transfer***.
3. The Data Transfer screen is displayed. Select Export.
4. “Local Archive-Int.HD” displays on the Transfer From pull-down menu and the patient list included in the Local Archive displays.

Exporting Data (continued)

5. Select the patient(s) to export by using the Transfer From search field (the upper field).

   You can use Windows commands to select more than one patient.

   To select a consecutive list of patients, click the cursor on the first name, move the cursor to the last name, then press and hold down the Shift+right Set key to select all the names.

   To select a non-consecutive list of patients, click the cursor at the first name, move the cursor to the next name, then press and hold down the Ctrl+right Set key, move the cursor to the next name, then press and hold down the Ctrl+right Set key again, etc.

   You can also search for patients via the Search key and string.

   Or, use Select All to select all patient.

NOTE: You need to use your best judgment when moving patients' images. If there are lots of images or loops, then only move a few patients at a time.

6. Select the destination at the Transfer To pull-down menu.
7. Press ***Transfer***. The progress bar displays during the transfer.
8. Press ***F3*** to eject the media. Specify that you want to finalize the media.

NOTE: To display exported DICOM or Raw DICOM images on a PC, you need the dedicated viewer.

Importing Data

To import an exam(s) to another Ultrasound system:

1. At the other Ultrasound system, insert the media.
2. Press **Patient** and select ***Data Transfer***.
3. The Data Transfer screen displays. Press Import.
4. Select the media from the Transfer From pull-down menu.
5. The Transfer From search field shows the patients available for import from the removable media you just loaded onto the system.
6. Select the patient(s) or the exam(s) from the list to be imported.
7. Press Transfer. The progress bar displays during the transfer.
8. Please wait for the patient information to be copied to this Ultrasound system. Informational messages appear while the import is taking place.
9. Press ***F3*** to eject the media.

NOTE: Use Import to restore EZBacked up and/or EZ Moved images.

NOTE: You can retrieve from the media to the Local HDD, playback, or process exam information on the system as Raw Data.

Query/Retrieve (Search and retrieve the data from DICOM device)

NOTE: For Query/Retrieve to find a patient, the patient MUST have a Patient ID.

Query

1. Press **Patient** and select ***Data Transfer***. The Data Transfer screen displays.
2. Select Q/R. The patient/exam list in the Local Archive displays in the Transfer To section.

NOTE: Only "Local Archive - Int.HD" is enabled for Transfer To.

3. Select the Query/Retrieve server from the Transfer From pull-down menu.

NOTE: The server is configured in the Utility screen. Multiple servers are able to be configured.

4. Press Query in the Transfer From section. The Query is performed.
5. The server's patient list displays.

NOTE: Press Query again to refresh the list.

Retrieve

1. Select the patient(s) or the exam(s) to be retrieved from the patient list.
2. Press Transfer. Retrieve the data from the Query/Retrieve Server. The progress bar displays during the transfer.

Worklist (Search and retrieve the Patient/Exam information)

1. Press **Patient** and select ***Data Transfer***. The Data Transfer screen displays.
2. Select Worklist. The patient/exam list in the Local Archive displays in the Transfer To section.

NOTE: *Only "Local Archive - Int.HD" is enabled for Transfer To.*

3. The Worklist used last time is displayed on the monitor display. Press Refresh to refresh the list or select another Worklist server from the Transfer From pull-down menu.

NOTE: *The worklist server is configured in the Utility screen. Multiple servers are able to be configured.*

NOTE: *You can configure whether the auto-refresh worklist has been enabled/disabled in the Utility screen. The system automatically refreshes the list when the exam data transfer accesses the Worklist server or changes the Worklist server.*

MPEGvue (Save the data to CD-R to see on the PC)

You can see the exam data on the PC by using MPEGvue.

1. Format the removable media. Label the removable media. Answer Yes/OK to the messages.
2. Press **Patient** and select ***Data Transfer***. The Data Transfer screen displays.
3. Select MPEGvue. The Patient list which has image in the Local Archive is displayed in the Transfer From section.

NOTE: Only "Local Archive - Int.HD" is enabled for the Transfer From.

4. Select CD-R from the Transfer To pull-down menu.
5. Select the patient(s) or the exam(s) from the list.

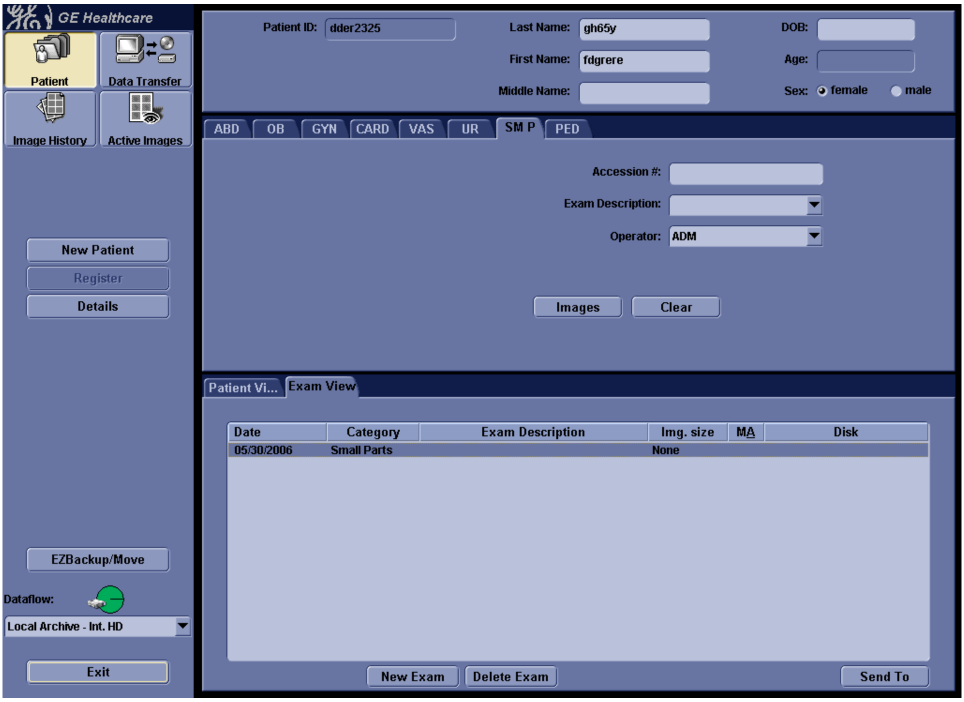
NOTE: If you press Clear in the Transfer From and Transfer To section, all the search criteria clears and the list is refreshed accordingly.

6. Press Transfer. The progress bar displays during the transfer.

CAUTION DO NOT use MPEGvue for diagnostic purposes. MPEGvue only transfers exams with images; exams without images are not transferred.

Send To (Send the image to the DICOM Device)

1. Search and select the patient and press ***Review***. The Patient Exam screen displays.


GE Healthcare
Patient
Data Transfer
Image History
Active Images
New Patient
Register
Details
EZBackup/Move
Exit
ABD
OB
GYN
CARD
VAS
UR
SM P
PED
Images
Clear
Patient Vi...
Exam View
New Exam
Delete Exam
Send To

Patient ID: dder2325
Last Name: gh65y
First Name: fdgrere
Middle Name:
DOB:
Age:
Sex: ● female ○ male

Accession #:
Exam Description:
Operator: ADM

Date	Category	Exam Description	Img. size	MA	Disk
05/30/2006	Small Parts		None		

Dataflow: Local Archive - Int. HD

Figure 15-6. Patient Exam Screen

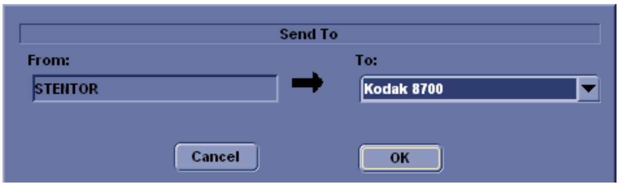
2. Select the exam which has the images and press ***Send to***.

NOTE: *You can only select "Local Archive - Int.HD" for Workflow.*

The Send To Dialogue box displays.

Send To (Send the image to the DICOM Device) (continued)

3. Select the destination device and press ***OK***.



STENTOR

Kodak 8700

Figure 15-7. Send To Dialogue Box

NOTE: *The destination device is configured in the Utility screen. Multiple devices are able to be configured.*

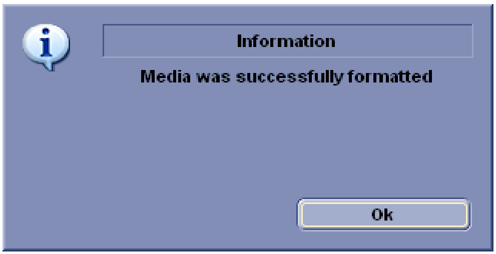
The successful/unsuccessful message is displayed at the bottom of the screen.

Daily Maintenance

Patient and User-Defined Backup Protocols

Back up patient data AFTER you've archived (via EZBackup/Move) images so that the pointers to the patient's images reflect that the images have been moved to removable media and are no longer on the hard drive.

1. Insert the backup media. Format the backup media. Select ***Utility***--> ***Connectivity***--> ***Removable Media***. Label the media.
2. The Ultrasound system displays a pop-up menu when the formatting has been completed. Press Ok to continue.Verify that the format was successful.



Information

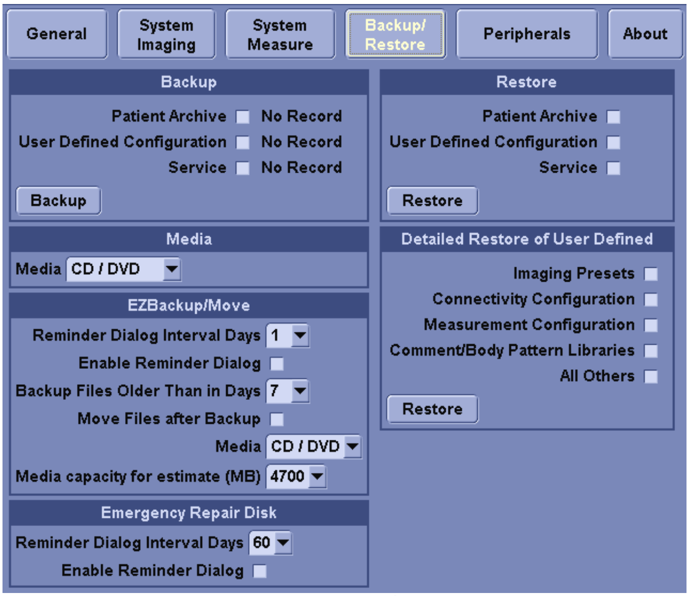
Media was successfully formatted

Figure 15-8. Format Successful Pop-up Menu

3. Select ***Utility***. Select System, then Backup/Restore.

Patient and User-Defined Backup Protocols (continued)

4. Select the media. Select everything under Backup by placing a check mark in front of Patient Archive and User Defined Configuration. Then press Backup.



Backup

Patient Archive ☐ No Record
User Defined Configuration ☐ No Record
Service ☐ No Record
Backup

Restore

Patient Archive ☐
User Defined Configuration ☐
Service ☐
Restore

Media

Media CD / DVD

Detailed Restore of User Defined

Imaging Presets ☐
Connectivity Configuration ☐
Measurement Configuration ☐
Comment/Body Pattern Libraries ☐
All Others ☐
Restore

EZBackup/Move

Reminder Dialog Interval Days 1
Enable Reminder Dialog ☐
Backup Files Older Than in Days 7
Move Files after Backup ☐
Media CD / DVD
Media capacity for estimate (MB) 4700

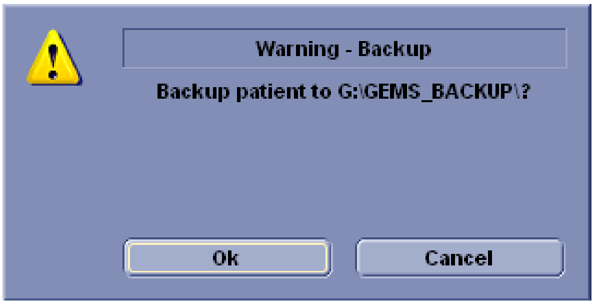
Emergency Repair Disk

Reminder Dialog Interval Days 60
Enable Reminder Dialog ☐

Figure 15-9. Backup/Restore Menu

NOTE: *The detailed section of this menu decouples the user defined configuration above. This allows you to selectively restore what you want to restore across multiple machines. Refer to Chapter 16 for more information.*

5. Answer ‘Ok’ to the following pop-up message as many times as the number of items you are backing up.



Warning - Backup

Backup patient to G:\GEMS_BACKUP\?

Figure 15-10. Back-up Confirmation Message

Notes

HINTS

DO NOT use the following special characters when saving images: slash (/), dash (-), or asterisk (*).

Other Printing Options

Connecting to a Standard Computer Printer

We currently support the following:

- Sony UP-D897MD
- Sony UP-D23MD
- HP460
- HP K550

To connect to a standard computer printer via the USB connection (Service).

1. Connect the printer to an outer USB port at the back of the system (in the Service port).
2. Set the printer as the standard printer via Utility --> System --> Peripherals page. Next to Standard Printer, select the printer from the drop-down list.
3. Assign one of the print keys to the printer via Utility --> Connectivity --> Buttons. Select the print button, then select the standard printer from the Destinations drop-down list. Select Add.
4. Bring up the worksheet you want to print on the monitor. Any page displayed on the monitor can be printed.
5. Press the appropriate print key that you assigned above.

NOTE: You can also set a preset to override the automatic area print and force the entire screen to print by pressing Utility -> System --> Peripherals and setting Print Full Screen.

NOTE: Worksheets and Graphs are printed in reverse video for easier readibility. You can also set a preset to override this presentation by pressing Utility --> System --> Peripherals and setting the Standard Printer to Enable Video Invert.

NOTE: The Field Service Engineer can connect a different printer if you have the driver for it on a CD-ROM (.inf file).*

Setting up the Off-Line Paper Printer

You can connect an off-line paper printer via the USB connection.

We recommend the following printers.

- HP460
- HP K550

CAUTION

DO NOT place an off-line paper printer inside the patient environment.

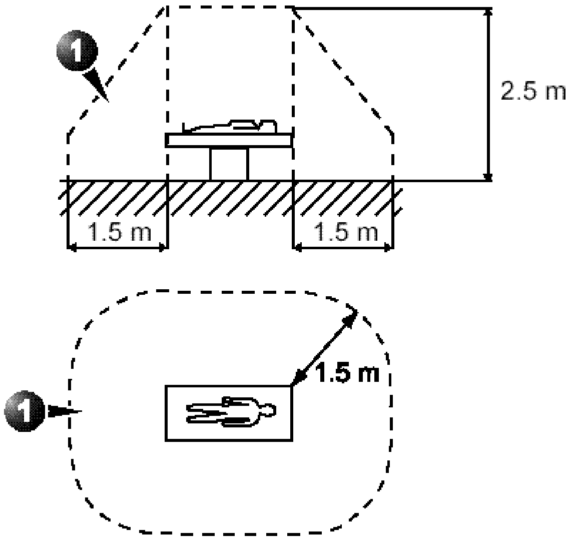
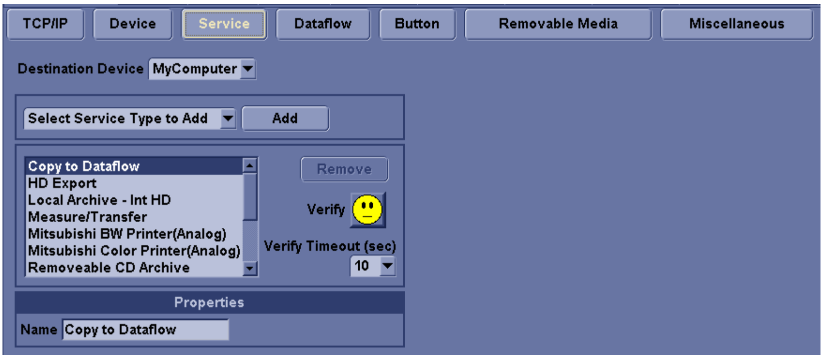


Figure 15-11. Patient Environment

Setting up the off-line paper printer

NOTE: *The printer driver is customized for the LOGIQ e at the factory; you do not need to change the settings.*

1. Connect the printer to the USB port.
2. Select ***Utility***--> ***Connectivity***--> ***Service***. **Add** the *Standard Print* service.



Destination Device: MyComputer

Select Service Type to Add

Copy to Dataflow
HD Export
Local Archive - Int HD
Measure/Transfer
Mitsubishi BW Printer(Analog)
Mitsubishi Color Printer(Analog)
Removeable CD Archive

Verify Timeout (sec): 10

Name: Copy to Dataflow

Figure 15-12. Connectivity -> Service Screen

3. Select the printer from the Printer pull-down Properties menu.

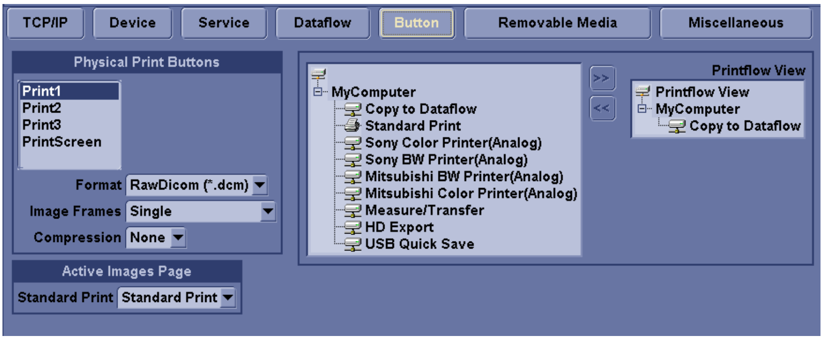
NOTE: *After selecting the printer, the field turns white.*

4. Set the following parameters in Properties:
   - *Rows*=3
   - *Columns*=2
   - *Orientation*=Portrait
   - *Right Margin (mm)*=10
5. Type the printer name in the *Name* field.

NOTE: *This name is used on the Button screen.*

Setting up the off-line paper printer (continued)

6. Press *Save*, then select the Button tab.


TCP/IP
Device
Service
Dataflow
Button
Removable Media
Miscellaneous
Physical Print Buttons
Print1
Print2
Print3
PrintScreen
Active Images Page
>>
<<
Printflow View
MyComputer
Copy to Dataflow
Standard Print
Sony Color Printer(Analog)
Sony BW Printer(Analog)
Mitsubishi BW Printer(Analog)
Mitsubishi Color Printer(Analog)
Measure/Transfer
HD Export
USB Quick Save
Printflow View
MyComputer
Copy to Dataflow

Format: RawDicom (*.dcm)
Image Frames: Single
Compression: None
Standard Print: Standard Print

Figure 15-13. Connectivity -> Button Screen

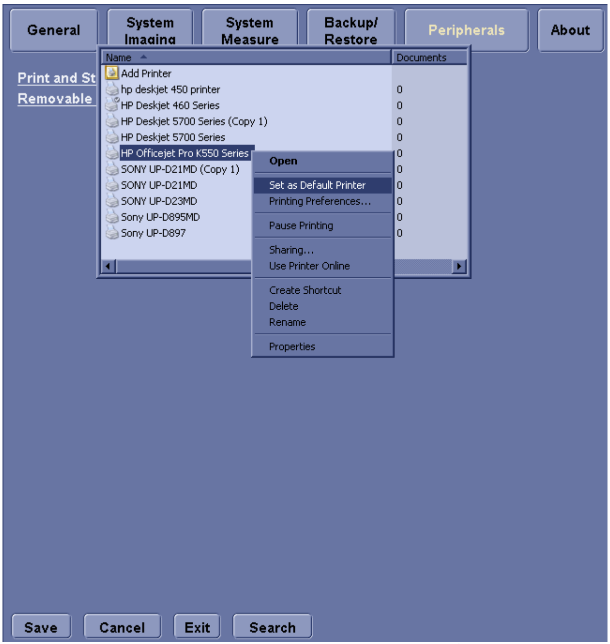
7. Select the appropriate print key (Print1, Print2...) from the Physical Print Buttons section.
8. Select the printer from the MyComputer column and press “>>” to move it to the Printflow View column.
9. If you want to assign this printer to the Standard Print Button on the Active Image Screen, select this printer at the Active Image Printer section.
10. Press Save.

NOTE: *If you want settings other than 1 image per sheet, or 2x3 sheet, or to improve the image quality, refer to the manual that came with the printer.*

Setting up the Printer to Print Reports

To set up the Off-Line Printer to print reports,

1. Press ***Utility***--> ***System***--> ***Peripherals*** and select *Printers* under Setup.
2. Select the printer in the Name column.
3. Press the **Left Set** key. Select “Set as Default Printer” and press Set.


General
System Imaging
System Measure
Backup/ Restore
Peripherals
About
Print and St
Removable
Open
Set as Default Printer
Printing Preferences...
Pause Printing
Sharing...
Use Printer Online
Create Shortcut
Delete
Rename
Properties
Save
Cancel
Exit
Search

Name	Documents
Add Printer	
hp deskjet 450 printer	0
HP Deskjet 460 Series	0
HP Deskjet 5700 Series (Copy 1)	0
HP Deskjet 5700 Series	0
HP Officejet Pro K550 Series	0
SONY UP-D21MD (Copy 1)	0
SONY UP-D21MD	0
SONY UP-D23MD	0
Sony UP-D895MD	0
Sony UP-D897	0

Figure 15-14. Report Printer Setup

4. Press Save.
5. Press Print on the Report screen to print the report.

Setting up Digital Peripherals

You set up digital peripherals from the Utility --> System --> Peripherals menu. The following digital printers are supported: Sony UP-D897 and Sony UP-D23MD.

NOTE: *Printing using a standard printing service overrides the orientation and N-up feature of the printer preferences. Printer preferences are set up in the printer folder (via Utility-->System-->Peripherals).*

Digital Printer Setup (LOGIQ e)

There are two steps to do when setting up a digital printer: 1) follow the procedure below for each printer, then 2) set up specific properties for each printer (specific instructions are provided for each printer following this section).

CAUTION

- Before powering on the LOGIQ e, connect the printer via the USB cable and turn the printer power on.
- DO NOT remove the cable while the LOGIQ e is powered on.

Follow this procedure for each printer:

1. Select Utility--> Connectivity--> Service. Add the Standard Print service. Select the printer from the Printer pull-down Properties menu. For the UP-895 printer, select “Portrait” as orientation.
2. Type the printer name in the Name field. This name is used on the Button screen. After you select the printer from the Printer pull-down Properties menu again, it turns white. Press Save.
3. Select Button. Select the appropriate print key (Print1, Print2...) from the Physical Print Buttons section. Select the printer from the MyComputer column and press >> to move it to the Printflow View column. Press Save.

Sony UP-D23 Instructions

Follow these steps to set up the Sony UP-D23 printer.

1. Press Utility-->System-->Peripherals. Select Printers. Select the UP-D23 printer, then right click (usually with the left Set key) and select Properties. Select Printing Preferences at the bottom of the page.
2. Select Landscape.

NOTE: Landscape values set up in Utility-->Connectivity--> Standard Print take precedence over this setting.

3. Select the Paper Tab and select UPC-21L as the Paper Size.
4. Select the Gray Balance Tab. Set both the Gray Balance A and B to 5.
5. Select the Graphics Tab. Select Gamma Select from the Color Adjust pull-down menu. Set Gamma 3. Select Lightness from the Color Adjust pull-down menu. Set Gamma to 4. Press Apply. Press OK.
6. Press Apply. Press OK.
7. Press Save, then Exit

Sony UP-D897 Instructions

Follow these steps to set up the Sony UP-D897 printer.

1. Press Utility-->System-->Peripherals. Select Printers. Select the UP-D897 printer, then right click (usually with the left Set key) and select Properties. Select Printing Preferences at the bottom of the page.
2. Select the Layout Tab and select Portrait.

NOTE: Change Landscape value to Portrait in Utility--> Connectivity--> Standard Print, which takes precedence.

3. Press the Advanced button at the bottom of the Layout page. Select 1980x1280 from the Paper Size pull-down menu. Select Density Adjust. Select Properties. Set Gamma to SOFT (TONE3). Set Dark to 0, set Light to 0, and set Sharpness to 7. Press Save. Save the file to the recommended location. Press Save. Press OK twice. Press Apply. Press OK.
4. On the Properties page, select the Sharing Tab. Ensure that ‘Do not share this printer’ is selected.
5. Select the Ports Tab. Select the USB Port for Sony UP-D895. Select Enable bidirectional support.
6. Select the Advanced Tab. Select Always Available, Priority 1, Driver for Sony UP-D895, Spool print documents so program finishes printing faster, Start printing immediately, Print spooled documents first, and Enable advanced printing features. Press OK.
7. Select the Security Tab. Specify permissions for each user group.
8. Press OK.
9. Press Save and Exit.

Standard Print

A Standard Print button has been added to the Active Images screen on the Patient menu. You need to configure the printer to the Standard Print button via ***Utility*** --> ***Connectivity*** --> ***Button***.

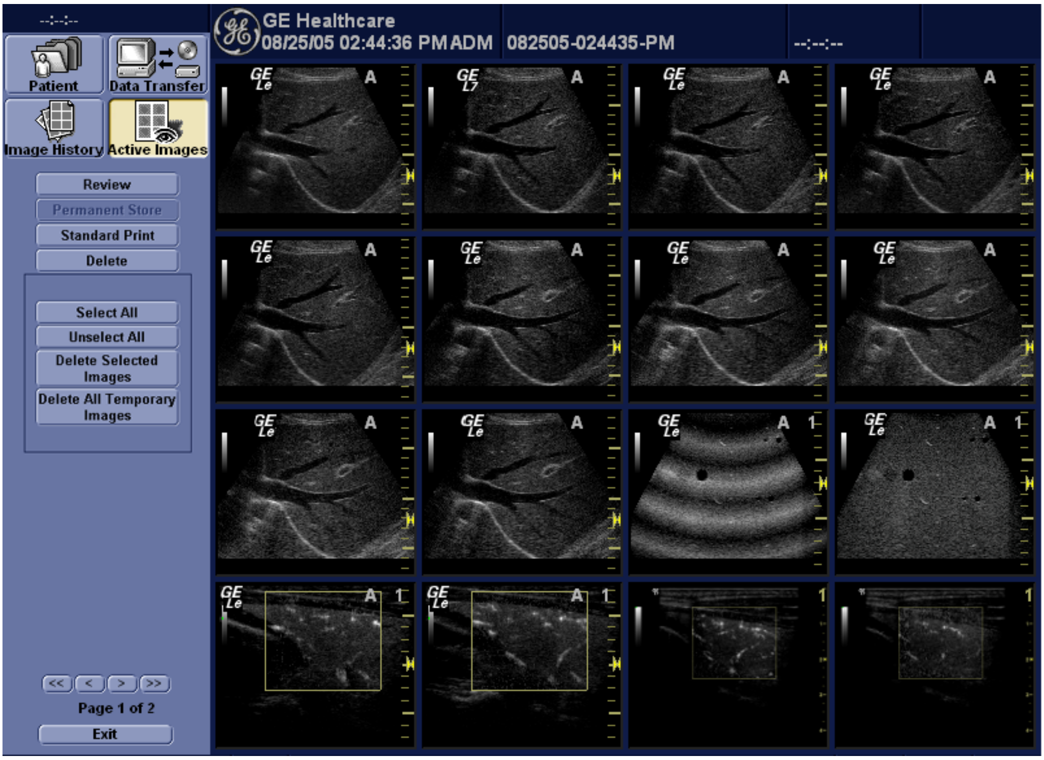

--:--:--
Patient
Data Transfer
Image History
Active Images
Review
Permanent Store
Standard Print
Delete
Select All
Unselect All
Delete Selected Images
Delete All Temporary Images
<<
<
>
>>
Page 1 of 2
Exit
GE Healthcare
08/25/05 02:44:36 PM ADM
082505-024435-PM
--:--:--

Figure 15-15.   Active Images Screen

Standard Print (continued)

To print an image,

1. Select the image you want to print from the Active Images screen. You can print one (1) image per sheet or 2x3 images per sheet.
2. Press Standard Print.

NOTE: *If the printer is not assigned to the button, you will get a message telling you to Check Printer Button Configuration.*

NOTE: *There is no warning to let you know that the printer is not functioning. Check the printer.*

To assign a printer to the Active Images screen,

- Configure the printer to the Standard Print Button on the Utility--> Connectivity--> Button screen.
- Select the printer at Standard Print under the Active Images Page section.

Transferring Patient Data to a PC

Transferring OB/GYN Patient Data to a PC

The LOGIQ e now supports the transfer of OB, GYN and Vascular patient data to a PC.

NOTE: The LOGIQ e currently supports Viewpoint, Sonultra, and CustomLab patient data communications software for the PC.

Connecting the LOGIQ e to the PC

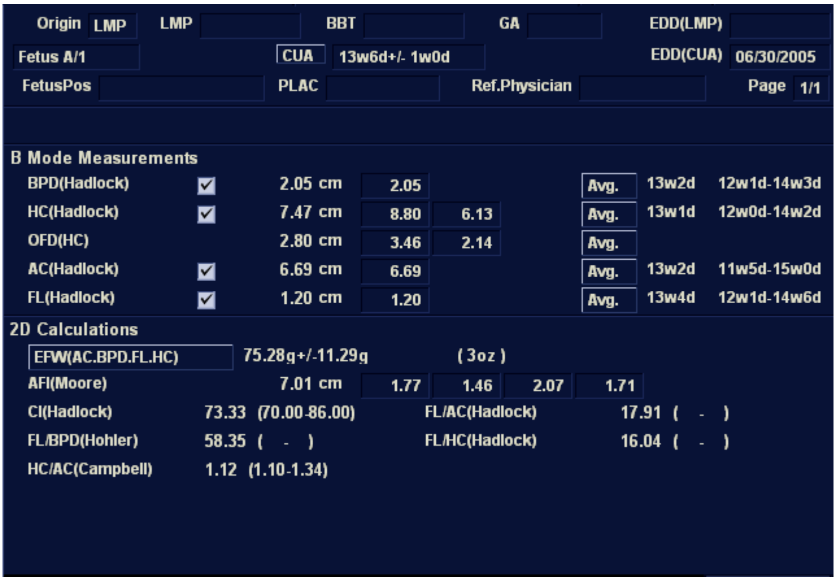
You need to connect an RS232C Converter and RS232C Cross Cable (cross-over 9-pin serial cable, not provided) to the USB port to connect a serial peripheral device to the system.

NOTE: To send the data, the LOGIQ e must be connected to the PC using a serial interface.

Transferring Patient Data

After you perform a scan, you can send the patient and measurement data to a PC that accepts patient data.

1. Ensure that the peripheral device is on.
2. For the current patient, on the Worksheet screen, select Meas. Transf.



Origin LMP LMP BBT GA EDD(LMP)

Fetus A/1 CUA 13w6d+/- 1w0d EDD(CUA) 06/30/2005

FetusPos PLAC Ref.Physician Page 1/1

B Mode Measurements

BPD(Hadlock)	☑	2.05 cm	2.05		Avg.	13w2d	12w1d-14w3d
HC(Hadlock)	☑	7.47 cm	8.80	6.13	Avg.	13w1d	12w0d-14w2d
OFD(HC)		2.80 cm	3.46	2.14	Avg.		
AC(Hadlock)	☑	6.69 cm	6.69		Avg.	13w2d	11w5d-15w0d
FL(Hadlock)	☑	1.20 cm	1.20		Avg.	13w4d	12w1d-14w6d

2D Calculations

EFW(AC.BPD.FL.HC) 75.28g+/-11.29g (3oz)

AFI(Moore) 7.01 cm 1.77 1.46 2.07 1.71

CI(Hadlock)	73.33 (70.00-86.00)	FL/AC(Hadlock)	17.91 (-)
FL/BPD(Hohler)	58.35 (-)	FL/HC(Hadlock)	16.04 (-)
HC/AC(Campbell)	1.12 (1.10-1.34)		

Figure 15-16. Transferring OB Worksheet Data to a PC

Transferring Patient Data (continued)

3. The system transfers the data. A beep on the peripheral device indicates a successful transfer. If there is a problem with the connection or transfer, the system displays an error message.

NOTE: If you currently do a heart rate measurement without specifying a vessel, as in the case of a fetal heart, the measurement IS NOT automatically transferred to the PC. You need to enter this measurement manually on the PC.

NOTE: Deleted measurements from the worksheet are still sent to the off-line reporting PC.

Portable Exam

To perform a portable exam (using the worklist),

1. Go to the worklist and get the patient(s) you will need for this portable exam(s).
2. Ensure that images will be saved to the local hard drive.
3. Press the Power On/Off switch and select Shutdown.
4. Proceed to perform the exam(s). Press Power On/Off. Select the patient, do the exam. Store images. Images are held in the spooler.
5. If there are additional patients to scan, repeat steps 4 and 5. After you have completed all portable exams, press Power On/Off and select Shutdown.
6. When you have returned from performing the portable exam(s), reconnect to the network. Press Power On/Off.
7. Press F4. Resend all of the images in the spooler to the printer/storage device.
8. Perform an EZBackup/Move to remove the images from the hard drive.

Chapter 16

Customizing Your System

Describes how to create system, user, and exam presets.

Presets

Overview

Preset Menus provides the following functionality:

- **System presets**. View and update general system configuration settings, measurement and analysis settings, and video settings; backup and restore data and configuration files.
- **Imaging presets**. View and update exam and imaging parameters.
- **Comment library presets**. Set up comment libraries by application.
- **Body Pattern library presets**. Set up body pattern libraries by application.
- **Application and User Defined presets**. Configure application- and user-specific settings.
- **Test patterns**. Helps configure system settings.
- **Connectivity Setup**. Define connection and communication setup, including exam dataflow information.
- **Measurement and Analysis presets**. Customize exam studies, create measurements, set up manual sequencing, and create OB Tables.
- **System Administration presets**. Perform system administrator activities such as setting up user IDs and logon formats.
- **Service**. Activates the Service Browser.
- **Search**. You can search for a parameter on the Utility pages (Measure and Service pages cannot be searched.)

To access these functions, select the ***Utility*** key on the control panel then select the appropriate Top/Sub Menu key key.

System Presets

Overview

System presets allows you to view or change the following parameters

- **General** – Location, Date/Time, Patient Info, Key Usage, and Utility configuration
- **System Imaging** – CINE Loop Store, Cardiac, Biopsy Guides, and Image Control and Display configuration
- **System Measure** – Measurement, Cursor, and Results Window configuration
- **Backup/Restore** – Backup, Media, EZBackup/EZMove, Emergency Repair Disk, Detailed Restore of User Defined.
- **Peripherals** – Video Settings, Print and Store Options, and Setup configuration
- **About** – System software, patent, and image information

Changing system parameters

To change system parameters:

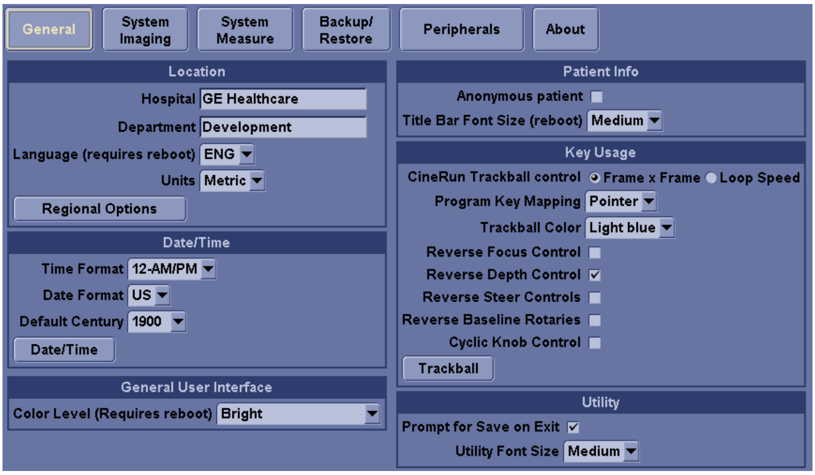
1. On the Control Panel, select **Utility**.
2. On the Top/Sub Menu, select ***System***.

   The System screen is displayed.
3. On the monitor display, move the **Trackball** to select the tab that has the information you want to change.
4. Select values for the parameters you want to change.
5. To save the changes, select the Save button. Select ***Exit*** to return to scanning. In some cases, you may need to reboot the system for the change to take effect.

NOTE: *In some cases, you may need to reboot the system for the change to take effect.*

System/General Preset Menu

The System/General screen allows you to specify hospital name and system date and time.


General
System Imaging
System Measure
Backup/ Restore
Peripherals
About
Location
Patient Info
Key Usage
Date/Time
General User Interface
Utility
Regional Options
Date/Time
Trackball

Hospital GE Healthcare
Department Development
Language (requires reboot) ENG
Units Metric
Time Format 12-AM/PM
Date Format US
Default Century 1900
Color Level (Requires reboot) Bright
Anonymous patient ☐
Title Bar Font Size (reboot) Medium
CineRun Trackball control ● Frame x Frame ○ Loop Speed
Program Key Mapping Pointer
Trackball Color Light blue
Reverse Focus Control ☐
Reverse Depth Control ☑
Reverse Steer Controls ☐
Reverse Baseline Rotaries ☐
Cyclic Knob Control ☐
Prompt for Save on Exit ☑
Utility Font Size Medium

Figure 16-1. System/General Preset Menu

Table 16-1: Location

Preset Parameter	Description
Hospital	Type the *institution*'s name.
Department	Type the institution's department name.
Preset Region	Unique imaging presets are available for each region (Americas, Asia, Europe, or None). A message appears, "This will result in loss of Imaging Presets. Do you want to continue? Select OK, or Cancel." Probe, Application, and 3D/4D imaging presets will be overwritten if you select OK. User-named presets, however, are not overwritten if you select OK.
Language	Select the appropriate language from the drop-down list.
Units	Select metric or US units of measurement.
Regional Options	Select to set up Russian/Greek keyboard.

System/General Preset Menu (continued)

Table 16-2: Date and Time

Preset Parameter	Description
Time Format	Select the time format: 12 Hr. AM/PM or 24 Hr.
Date Format	Select the date format: dd/mm/yyyy, mm/dd/yyyy, or yyyy/mm/dd.
Default Century	Select the default century for the system to use.
Date/Time	Select to display the Date/Time Properties window, to specify the system date, time, time zone, and to auto adjust for daylight savings time.

Table 16-3: General User Interface

Preset Parameter	Description
Color Level (requires reboot)	Select System Color according to the condition of the room.

Table 16-4: Patient Information

Preset Parameter	Description
Anonymous patient	When selected, no patient information is displayed on the scanning screen Title bar.
Title Bar Font Size (reboot)	Select to display patient information in the title bar using a small, medium, or large font size. You need to reboot the system for this change to take effect.

System/General Preset Menu (continued)

Table 16-5: Key Usage

Preset Parameter	Description
CineRun Trackball control	Select Frame by Frame or Loop Speed. Frame by Frame manually steps through CINE playback by using the Trackball. Loop Speed controls the speed of the CINE Loop playback. Roll the Trackball to the left to slow down playback; roll the Trackball right to speed up playback. The Loop Speed displays in the lower, right-hand corner of the screen.
Program Key Mapping	Allows you to program the left set key's functionality (Pointer, Set, or Freeze). You need to reboot the system after reprogramming the Set and Select keys.
Reverse Rotary	You can change key direction for Focus Position, Depth, Steer, and Baseline.
Trackball	Field Engineer use only. Select to display the Mouse Properties window (faster, slower, snap-to default).
Cyclic Knob Control	When selected, the cycle knob control function does not allow the primary menu's values to be cycled.

Table 16-6: Utility

Preset Parameter	Description
Prompt for Save on Cancel or Exit	If selected, the system prompts you to save data when you select cancel or exit without saving.
Utility Font Size	Select the font size you want to use to view the Utility menus: Small, Medium, or Large.

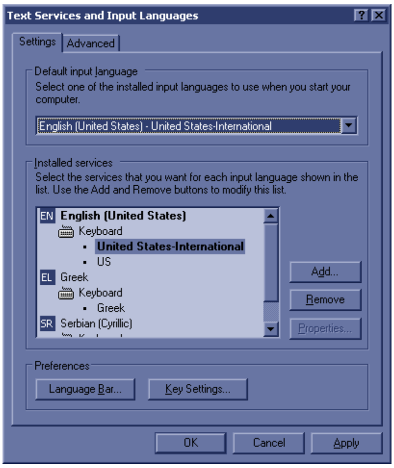
Foreign Language Keyboard Setup

Keyboard Setup for non-Russian/ Greek/Chinese Languages

To set up the keyboard for non-Russian/Greek/Chinese languages:

NOTE: You must apply the changes on each setup page before moving to the next page.

1. In Utility--> System--> General, set the Language as desired. Do not save this setting.
2. Press Regional Options, select the Language tab, press Details, under Installed Services press Add to set the Keyboard layout/IME to United States-International, press OK, set the Default input language to English (United States) - United States International, press Apply, Press OK.


Text Services and Input Languages
Settings
Advanced
Default input language
Installed services
Add...
Remove
Properties...
Preferences
Language Bar...
Key Settings...
OK
Cancel
Apply

Select one of the installed input languages to use when you start your computer.

English (United States) - United States-International

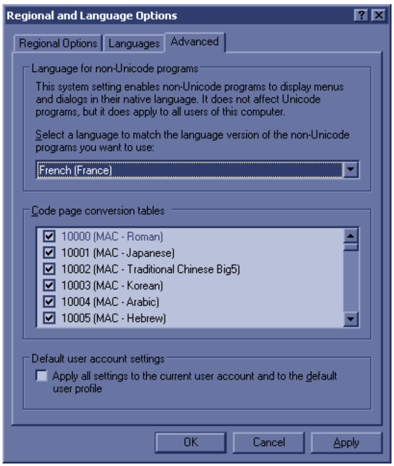
Select the services that you want for each input language shown in the list. Use the Add and Remove buttons to modify this list.

EN English (United States)
  Keyboard
    - United States-International
    - US
EL Greek
  Keyboard
    - Greek
SR Serbian (Cyrillic)

Figure 16-2. Selecting the International Keyboard

Keyboard Setup for non-Russian/Greek/Chinese Languages (continued)

3. Select the Advanced tab, then select the language in the Language for non-Unicode programs pull-down menu. Press Apply. Answer Yes to use files already loaded on the hard disk, then answer No to not reboot the system yet, press OK. Press Save and Exit the Utility screen.



Language for non-Unicode programs

This system setting enables non-Unicode programs to display menus and dialogs in their native language. It does not affect Unicode programs, but it does apply to all users of this computer.

Select a language to match the language version of the non-Unicode programs you want to use:

French (France)

Code page conversion tables

☑ 10000 (MAC - Roman)
☑ 10001 (MAC - Japanese)
☑ 10002 (MAC - Traditional Chinese Big5)
☑ 10003 (MAC - Korean)
☑ 10004 (MAC - Arabic)
☑ 10005 (MAC - Hebrew)

Default user account settings

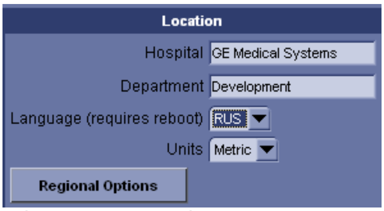
☐ Apply all settings to the current user account and to the default user profile

Figure 16-3. Set Language

4. Reboot the system. When your system restarts, the system appears in the selected language.
5. To type foreign characters, press Ctrl+Shift to change the keyboard to the international keyboard.

Keyboard Setup Procedure for Russian/Greek/ Chinese

1. In Utility--> System--> General, set the Language as Russian or Greek. Do not save this setting.



Location

Hospital: GE Medical Systems

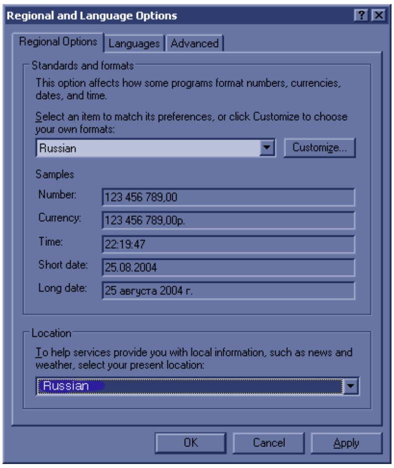
Department: Development

Language (requires reboot): RUS

Units: Metric

Figure 16-4. Changing the System Language to Russian/ Greek/Chinese

2. Press Regional Options, under Standards and Formats select Russian, Greek or Chinese (PRC). Under Location select Russia, Greece or China. Press Apply.



Regional and Language Options

Standards and formats

This option affects how some programs format numbers, currencies, dates, and time.

Select an item to match its preferences, or click Customize to choose your own formats:

Russian

Samples

Number: 123 456 789,00

Currency: 123 456 789,00р.

Time: 22:19:47

Short date: 25.08.2004

Long date: 25 августа 2004 г.

Location

To help services provide you with local information, such as news and weather, select your present location:

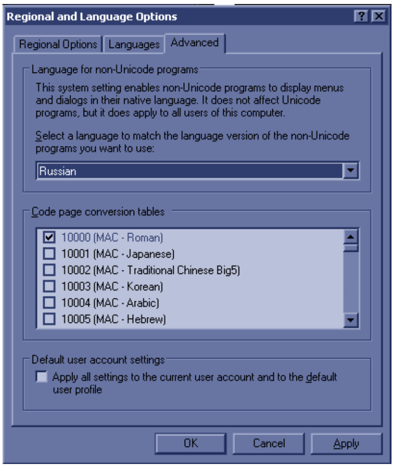
Russian

Figure 16-5. Regional Options

3. Select the Language tab, press Details, under Installed Services select the Russian, Greek or Chinese (PRC) keyboard, under Default input language select Russian - Russian, Greek - Greek or Chinese (PRC) - Microsoft IME 3.0. Press Apply, Press OK.

Keyboard Setup Procedure for Russian/Greek/Chinese (continued)

4. Select the Advanced tab, then select Russian, Greek or Chinese (PRC) in the Language for non-Unicode programs pull-down menu. Press Apply. Answer Yes to use files already loaded on the hard disk, then answer No to not reboot the system yet, press OK. Press Save and Exit the Utility screen.


Regional and Language Options
?
Regional Options
Languages
Advanced
Language for non-Unicode programs
Code page conversion tables
Default user account settings
OK
Cancel
Apply

This system setting enables non-Unicode programs to display menus and dialogs in their native language. It does not affect Unicode programs, but it does apply to all users of this computer.

Select a language to match the language version of the non-Unicode programs you want to use:

Russian

☑ 10000 (MAC - Roman)
☐ 10001 (MAC - Japanese)
☐ 10002 (MAC - Traditional Chinese Big5)
☐ 10003 (MAC - Korean)
☐ 10004 (MAC - Arabic)
☐ 10005 (MAC - Hebrew)

☐ Apply all settings to the current user account and to the default user profile

Figure 16-6. Set Language

5. Reboot the system. When your system restarts, the system appears in the selected language.
6. To switch between the English and Russian (or Greek or Chinese) keyboard, press Ctrl+Shift to change the keyboard to the Russian, Greek or Chinese keyboard.
7. Apply the changes by pressing Apply. Press OK TWICE.

NOTE: *To have the settings take effect, you **MUST** turn off the system and turn it back on.*

Keyboard Setup Procedure for Russian/Greek/Chinese (continued)

Here is an example of the Russian keyboard:

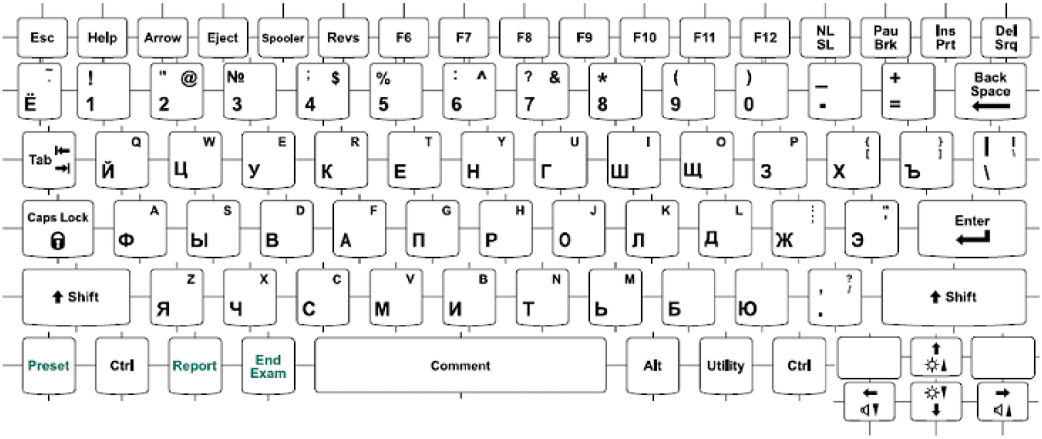
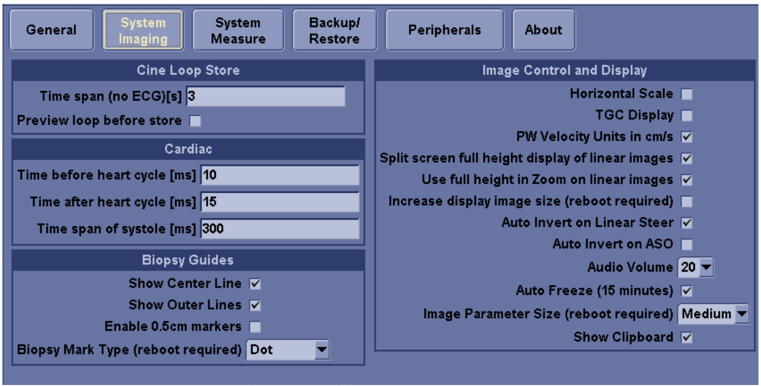

Esc
Help
Arrow
Eject
Spooler
Revs
F6
F7
F8
F9
F10
F11
F12
NL SL
Pau Brk
Ins Prt
Del Srq
Ё
! 1
" @ 2
№ 3
; $ 4
% 5
: ^ 6
? & 7
* 8
(9
) 0
_ -
+ =
Back Space
Tab
Q Й
W Ц
E У
R К
T Е
Y Н
U Г
I Ш
O Щ
P З
{ [Х
}] Ъ
| \
Caps Lock
A Ф
S Ы
D В
F А
G П
H Р
J О
K Л
L Д
: ; Ж
" ' Э
Enter
Shift
Z Я
X Ч
C С
V М
B И
N Т
M Ь
Б
Ю
, . ? /
Shift
Preset
Ctrl
Report
End Exam
Comment
Alt
Utility
Ctrl

Figure 16-7. Russian Keyboard

System/System Imaging Preset Menu

The System/System Imaging screen allows you to specify parameters for cine loop storage and display, patient information, key usage, and image control and display.



Cine Loop Store

Time span (no ECG)[s] 3

Preview loop before store ☐

Cardiac

Time before heart cycle [ms] 10

Time after heart cycle [ms] 15

Time span of systole [ms] 300

Biopsy Guides

Show Center Line ☑

Show Outer Lines ☑

Enable 0.5cm markers ☐

Biopsy Mark Type (reboot required) Dot

Image Control and Display

Horizontal Scale ☐

TGC Display ☐

PW Velocity Units in cm/s ☑

Split screen full height display of linear images ☑

Use full height in Zoom on linear images ☑

Increase display image size (reboot required) ☐

Auto Invert on Linear Steer ☑

Auto Invert on ASO ☐

Audio Volume 20

Auto Freeze (15 minutes) ☑

Image Parameter Size (reboot required) Medium

Show Clipboard ☑

Figure 16-8. System/System Imaging Preset Menu

Table 16-7: Cine Loop Store

Preset Parameter	Description
Time span (no ECG) [s]	Select the number of seconds of CINE Loop storage (no ECG). The default is 3 seconds (approximately 77 B/W frames, 97 Color Frames).
Preview loop before store	When selected, allows you to review cine loops before storage.

Table 16-8: Cardiac

Preset Parameter	Description
Time before heart cycle [ms]	Sets the total storage time span of the cine loop in ECG mode.
Time after heart cycle [ms]	Sets the total storage time span of the cine loop in ECG mode.
Time span of systole [ms]	The default systolic time to enable synchronization of cine loops.

Table 16-9: Biopsy Guides

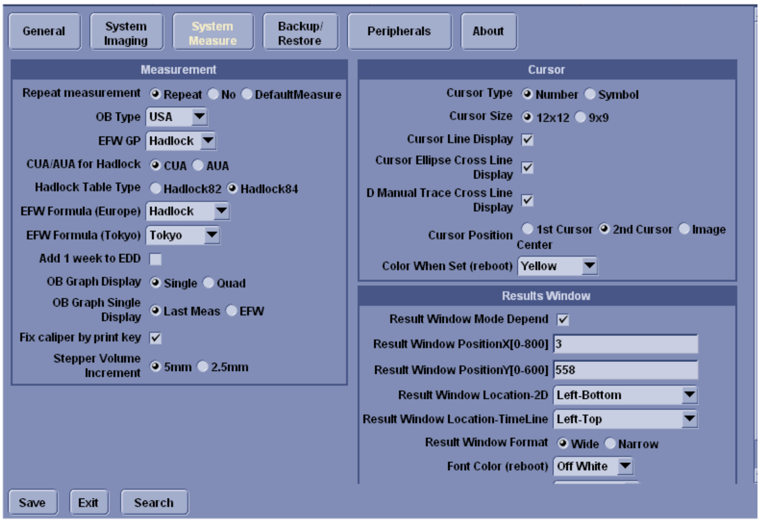
Preset Parameter	Description
Show Center Line	Displays center biopsy guideline.
Show Outer Lines	Displays outer biopsy guidelines.
Enable 0.5cm markers	Activates biopsy depth markers every 0.5cm.
Biopsy Mark Type	Choose Dot, Polyline or Polyline for the type of biopsy mark displayed.

Table 16-10: Image Control and Display

Preset Parameter	Description
Horizontal Scale	Select to display width markers.
TGC Display	Select to display TGC curve.
PW Velocity Units in cm/s	Select to change scale on timeline from centimeters per second to meters per second.
Split screen full height display of linear images	When selected, while in split screen and using a linear probe, the system clips the sides of images so that the image can fill the available display.
Use full height in Zoom on linear images	Select to use full height zoom while scanning on a linear image.
Increase display image size	Increases the size of the displayed image. After you save this feature, go back to scanning, press B-Mode or reboot the system. The image size changes.
Auto Invert on Linear Steer	When selected, for auto calcs, automatically inverts the timeline if needed when using ASO.
Auto Invert on ASO	Automatically inverts the spectrum with ASO.
Audio Volume	Adjusts the Doppler audio volume.
Auto Freeze (15 minutes)	Automatically freezes the system after 15 minutes of inactivity.
Image Parameter Size (reboot required)	Choices=small, medium, and large. Must reboot the system.
Show Clipboard	Select to show clipboard.

System/System Measure Preset Menu

The System/System Measure screen allows you to specify measurement parameters such as the type of default OB measurements and calculations. You can also define cursor and Results Window default functionality.



Measurement

Repeat measurement ● Repeat ○ No ○ DefaultMeasure
OB Type USA
EFW GP Hadlock
CUA/AUA for Hadlock ● CUA ○ AUA
Hadlock Table Type ○ Hadlock82 ● Hadlock84
EFW Formula (Europe) Hadlock
EFW Formula (Tokyo) Tokyo
Add 1 week to EDD ☐
OB Graph Display ● Single ○ Quad
OB Graph Single Display ● Last Meas ○ EFW
Fix caliper by print key ☑
Stepper Volume Increment ● 5mm ○ 2.5mm

Cursor

Cursor Type ● Number ○ Symbol
Cursor Size ● 12x12 ○ 9x9
Cursor Line Display ☑
Cursor Ellipse Cross Line Display ☑
D Manual Trace Cross Line Display ☑
Cursor Position ○ 1st Cursor ● 2nd Cursor ○ Image Center
Color When Set (reboot) Yellow

Results Window

Result Window Mode Depend ☑
Result Window PositionX[0-800] 3
Result Window PositionY[0-600] 558
Result Window Location-2D Left-Bottom
Result Window Location-TimeLine Left-Top
Result Window Format ● Wide ○ Narrow
Font Color (reboot) Off White

Figure 16-9. System/System Measure Preset Menu

Table 16-11: Measurement

Preset Parameter	Description
Repeat Measurement	Select Off, Repeat, DefaultMeas
OB Type	Select which OB measurements and calculations studies to use: USA, Europe, Tokyo, Osaka, or ASUM.
EFW GP	Select the source used to calculate EFW-GP Estimated Fetal Weight-Growth Percentile)
CUA/AUA for Hadlock	Select to use CUA (Composite Ultrasound Age) or AUA (Average Ultrasound Age) as the default
Hadlock Table Type	Select Hadlock 82 or Hadlock 84 tables
EFW Formula (Europe)	Select the source used to calculate EFW (Europe) (Estimated Fetal Weight), Shepard, Merz, Hadlock, German, Rich
EFW Formula (Tokyo)	Select the source used to calculate EFW (Tokyo) (Estimated Fetal Weight)
Add 1 week to EDD	Select to add additional week to estimated date of delivery
OB Graph Display	Select Single or Quad for displaying OB Graphs.
OB Graph Single Display	Select Last Meas or EFW Single OB Graph displayed by default.
Fix Caliper by Print key	Select to use the Print key like the Set key.

Table 16-11: Measurement (Continued)

Preset Parameter	Description
Stepper Volume Increment	Select either 5mm or 2.5mm increments.

Table 16-12: Cursor

Preset Parameter	Description
Cursor Type	Select whether to mark measurements with numbers or symbols.
Cursor Size	Specify 12x12 or 9x9.
Cursor Line Display	If selected, after you press Set to complete a measurement, the cursor line is displayed. If not selected, after you press Set to complete a measurement, only the cursor number or symbol is displayed.
Cursor Ellipse Cross Line Display	Check box to display the cross line in Ellipse.
D Manual Trace Cross Line Display	Check box to display the cross line with the caliper.
Cursor Position	Select 1st Cursor, 2nd Cursor, or Image Center.
Color When Set (reboot)	Select white, yellow, bright red, or orange.

Table 16-13: Results Window

Result Window Mode Depend	Select this if you want the measurement result window to be repositioned, depending on the mode.
Result Window Position X[0-800]	You can set the coordinates for the measurement result window when you do not have the result window set to be mode dependent. This is the X coordinate (left/right)
Result Window Position Y[0-600]	You can set the coordinates for the measurement result window when you do not have the result window set to be mode dependent. This is the Y coordinate (up/down)
Result Window Location-2D	Select the Result Window location on the Monitor Display: Left-Bottom, Left-Top, Right-Bottom, or Right-Top.
Result Window Location-Timeline	Select the Result Window location: Left-Bottom, Left-Top, Right-Bottom, or Right-Top.
Result Window Format	Select Wide or Narrow.
Font Color (reboot)	Select White, Off White, Yellow, Bright Red or Orange (reboots the system)

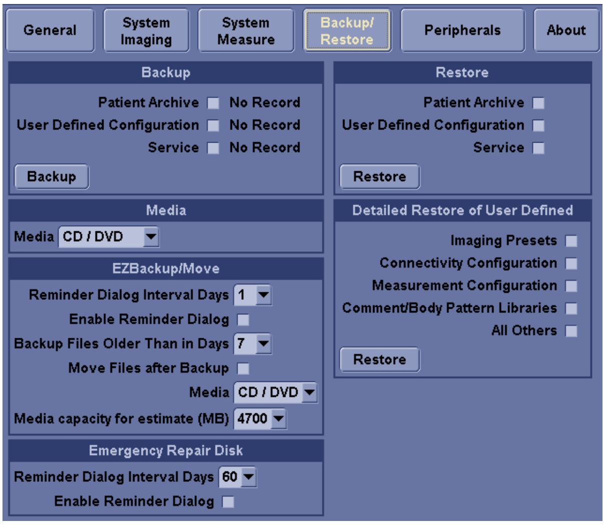
System/Backup and Restore Preset Menu

The backup and restore procedures described in this section are divided into two parts. The first part describes procedures to backup and restore patient data. The second part describes procedures to backup and restore system and user-defined configurations.

Depending on the system, you can use either a CD, DVD, USB Flash Drive, or USB Hard Disk for system backup/restore. For the sake of simplicity, we have used the CD in the following examples.

WARNING

GE Medical Systems is not responsible for lost data if the suggested backup procedures are not followed and will not aid in the recovery of lost data.



Backup

Patient Archive ☐ No Record
User Defined Configuration ☐ No Record
Service ☐ No Record

Restore

Patient Archive ☐
User Defined Configuration ☐
Service ☐

Media

Media CD / DVD

Detailed Restore of User Defined

Imaging Presets ☐
Connectivity Configuration ☐
Measurement Configuration ☐
Comment/Body Pattern Libraries ☐
All Others ☐

EZBackup/Move

Reminder Dialog Interval Days 1
Enable Reminder Dialog ☐
Backup Files Older Than in Days 7
Move Files after Backup ☐
Media CD / DVD
Media capacity for estimate (MB) 4700

Emergency Repair Disk

Reminder Dialog Interval Days 60
Enable Reminder Dialog ☐

Figure 16-10. System/Backup/Restore Preset Menu

System/Backup and Restore Preset Menu (continued)

Table 16-14: Backup

Preset Parameter	Description
Patient Archive	Select to back up patient data.
User Defined Configuration	Select to back up the user-defined configuration settings.
Service	Select to back up Service (iLinq and Network) settings.
Backup	Select to begin the backup.

Table 16-15: Media

Preset Parameter	Description
Media	Select media type to use for backup and restore.

Table 16-16: EZBackup/Move

Preset Parameter	Description
Reminder Dialog Interval days	Specify the number of days after the last backup that you want the system to prompt you to perform an EZBackup/Move procedure (only for moving images).
Enable Reminder Dialog	Select to activate the EZBackup/Move reminder pop-up dialog.
Backup files older than in days	The system will backup images older than the number of days specified here. If you enter a zero (0), then all of the images from today on will be backed up.
Move files after backup	Check this box to delete images from the hard drive after the backup.
Media	Select media type.
Media capacity for estimate (MB)	Specify the capacity of the backup media.

Table 16-17: Emergency Repair Disk

Preset Parameter	Description
Reminder Dialog Interval days	Specify the number of days after the last backup that you want the system to prompt you to perform an EZBackup/Move procedure (only for moving images).
Enable Reminder Dialog	Select to activate the EZBackup/Move reminder pop-up dialog.

Table 16-18: Restore

Preset Parameter	Description
Patient Archive	Select to restore patient data.
User Defined Configuration	Select to restore the user-defined configuration settings.
Service	Select to restore service iLinq and Network settings. **CAUTION**: DO NOT restore service presets on to a different LOGIQ e system. Only restore service presets to the same system.
Restore	Select to begin the restore process for the selected configuration files.

System/Backup and Restore Preset Menu (continued)

The detailed section of this menu allows you to restore one area at a time from the user defined configuration. This allows you to selectively restore what you want to restore across multiple machines. Check the box(es) you want to restore, insert the appropriate media, and press Restore.

Table 16-19: Detailed Restore

Preset Parameter	Description
Imaging Presets	Select to restore imaging presets.
Connectivity Configuration	Select to restore connectivity configurations.
Measurement Configuration	Select to restore measurement configurations.
Comment/Body Pattern Library	Select to restore comment and body pattern configurations.
All Others	Select to restore all other configurations not listed in the Detailed Restore section. This includes parameters defined on the System preset menus.
Restore	Select to begin the restore process for the selected configuration files.

Backup and restore strategy: patient data

To minimize accidental loss of data, perform backup of the patient archives stored on the local hard drive **DAILY** as described in this section. Use a Backup/Restore disk to back up patient archives from the hard drive, using the backup procedure described in this section. Data from the Backup/Restore disk may be restored to the local hard drive using the restore procedure.

⚠ CAUTION

The restore procedure overwrites the existing database on the local hard drive.

⚠ CAUTION

Make sure to verify the media after writing of data, such as EZBackup, SaveAs or Export.

Before deleting a patient or image from the patient screen, make sure you have saved the data by EZBackup/Backup or Export and verify that the media transfer of data was successful.

NOTE: *To perform backup and restore procedures, you must login with administrator privileges.*

Backup procedure: patient data

1. Insert media into the media drive.

NOTE: *For information about formatting media, see “Formatting removable media”.*

2. On the Control Panel, press **Utility**.
3. Select ***System***.
4. On the monitor display, select Backup/Restore.

   The Backup/Restore screen is displayed.

NOTE: *If you are not logged in with administrator privileges, the Operator Login window is displayed. Log on with administrator privileges.*

5. In the Backup list, select Patient Archive.
6. In the Media field, select CD.
7. Select Backup.

   The system performs the backup. As it proceeds, status information is displayed on the Backup/Restore screen.

EZBackup/EZMove

EZBackup/EZMove allows you to manage hard disk space (move images off the hard drive) while maintaining the patient database on the scanner, as well as to back up the patient database and images.

HINTS

PLEASE READ THIS

Ensure that you have established a data management protocol for your office/institution. You MUST manage the backup media by keeping a log and by creating a media filing system.

For example, if you need to back up 500 MB/day, or 2.5 GB/ week, then you need to back up 5 CDs/week, or ~250CDs/ year.

Generally speaking, you should back up the system when you have 10 GB of images to back up.

You should assign the person who is in charge of performing the backups. Backups will vary by the volume of your work. You need to track how long it takes your office/institution to get to 10 GB, and set the back-up parameters accordingly.

Your office/institution needs to determine your backup strategy, for instance, backup weekly and move monthly. It should be an easy strategy to perform and to remember. And follow this same strategy/schedule consistently.

It's also useful to keep your more recent information on the hard drive since it's easier to recall that way.

CAUTION

DO NOT use DVD-RAM for EZBackup/EZMove.

Use a CD or DVD-R for EZBackup/EZMove.

EZBackup/EZMove (continued)

CAUTION If you use EZBackup/EZMove as a "true" patient archive, you must maintain a separate backup of the patient database. If for any reason the Local Archive - Int HD gets corrupted or the base system software has to be reloaded, then the patient archive is the ONLY way to rebuild the EZBackup/EZMove patient archive.

CAUTION After copying the image file to the media, EZMove deletes the image file from the Local HD.

Basically, when you perform the EZBackup/EZMove procedure, you insert the media (or connect USB HDD if applicable), the system backs up/moves the images, and creates a reference between the patient database and the media's volume.

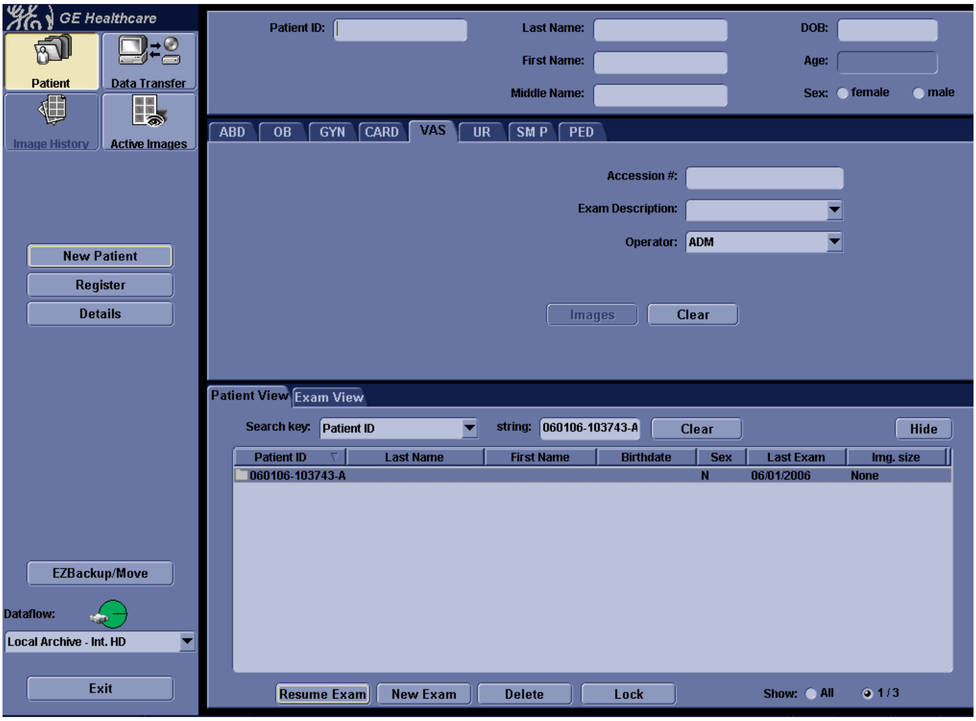
1. Prepare unformatted media or the USB HDD before starting EZBackup/EZMove.

NOTE: BEFORE starting the EZBackup, select "Unlock All" in Utility --> Admin --> Logon.

2. Specify the EZBackup/EZMove setup on the Utility --> System --> Backup/Restore page.

EZBackup/EZMove (continued)

3. To start the EZBackup/EZMove procedure, go to the Patient menu and select the EZBackup/EZMove button at the bottom of the Patient list. The EZBackup/EZMove Wizard starts.


GE Healthcare
Patient
Data Transfer
Image History
Active Images
New Patient
Register
Details
EZBackup/Move
Exit
Patient ID:
Last Name:
DOB:
First Name:
Age:
Middle Name:
Sex: ○ female ○ male
ABD
OB
GYN
CARD
VAS
UR
SM P
PED
Accession #:
Exam Description:
Images
Clear
Patient View
Exam View
Clear
Hide
Resume Exam
New Exam
Delete
Lock
Show: ○ All ● 1 / 3

Operator: ADM

Dataflow: Local Archive - Int. HD

Search key: Patient ID string: 060106-103743-A

Patient ID	Last Name	First Name	Birthdate	Sex	Last Exam	Img. size
060106-103743-A				N	06/01/2006	None

Figure 16-11. New Patient EZBackup/EZMove Example

NOTE: *EZBackup/EZMove can take up to 20 minutes (or longer, depending on the size of the backup). Make sure to schedule this at the same time daily, when no patients are scheduled.*

EZBackup/EZMove (continued)

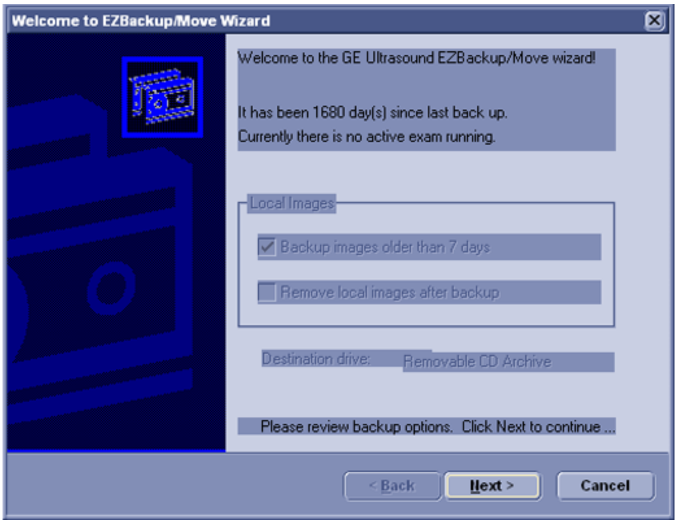
4. Verify the information on the first page of the EZBackup/EZMove Wizard, then press *Next*.

   Full backup options display on the first page of the EZBackup wizard. If you want to backup all of the exams in the range (even if the exam was previously backed up, check this option).

NOTE: *You can set the range in Utility --> System --> Backup/Restore --> Backup files older than in days.*

If you uncheck this option, the system only backs up exams which have not yet been backed up.

NOTE: *If you update an exam which is already backed up, the exam is also backed up.*



Welcome to EZBackup/Move Wizard

Welcome to the GE Ultrasound EZBackup/Move wizard!

It has been 1680 day(s) since last back up.
Currently there is no active exam running.

Local Images

☑ Backup images older than 7 days

☐ Remove local images after backup

Destination drive: Removable CD Archive

Please review backup options. Click Next to continue ...

Figure 16-12. EZBackup/EZMove Wizard, Page 1

NOTE: *You do not need to format the media prior to performing an EZBackup/EZMove. You cannot use formatted media for EZBackup/EZMove.*

EZBackup/EZMove (continued)

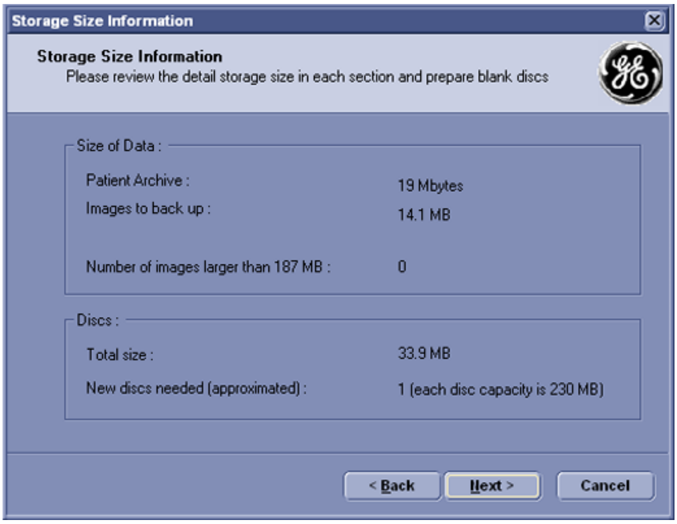
NOTE: *EZBackup/EZMove cannot span a single image across two (2) or more media. Therefore, if EZBackup/EZMove encounters an image that is greater than the capacity of the media, it skips the oversized image.*

NOTE: *EZBackup/EZMove does not store images to media in sequential order. Instead it maximizes the most amount of images per media.*

NOTE: *The calculation for the number of backup CDs is only an estimate. Allow for one additional CD when performing an EZBackup/EZMove.*

NOTE: *If you use the USB HDD, some wizards and the pop-up messages DO NOT appear.*

5. Verify the information on the EZBackup/EZMove Wizard, Page 2. The backup may span multiple media. This page tells you how many media you need to do this backup. After you have gathered the media (allow for one extra media, just in case), you are ready to begin the backup. Press *Next*.



Storage Size Information

Storage Size Information

Please review the detail storage size in each section and prepare blank discs

Size of Data :

Patient Archive :	19 Mbytes
Images to back up :	14.1 MB
Number of images larger than 187 MB :	0

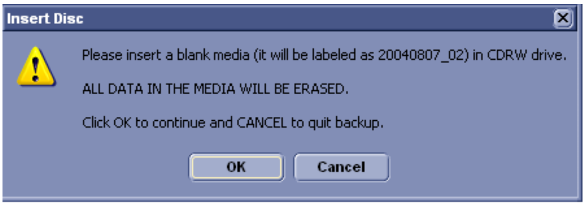
Discs :

Total size :	33.9 MB
New discs needed (approximated) :	1 (each disc capacity is 230 MB)

Figure 16-13. EZBackup/EZMove Wizard, Page 2

EZBackup/EZMove (continued)

6. A pop-up message appears that provides you with the media label. Label the media, then insert the media. Press *OK*.


Insert Disc

Please insert a blank media (it will be labeled as 20040807_02) in CDRW drive.

ALL DATA IN THE MEDIA WILL BE ERASED.

Click OK to continue and CANCEL to quit backup.

Figure 16-14. Insert Media Message

   a. Ensure that you label the media with not only the volume name indicated on the Insert Media Message, but with the name of the LOGIQ e system where this backup/move procedure was done.
   b. Update the EZBackup/EZMove log with this information the volume information and the location of the media.
   c. After the backup/move has been completed, file the media.

Table 16-20: Typical EZBackup/EZMove Log

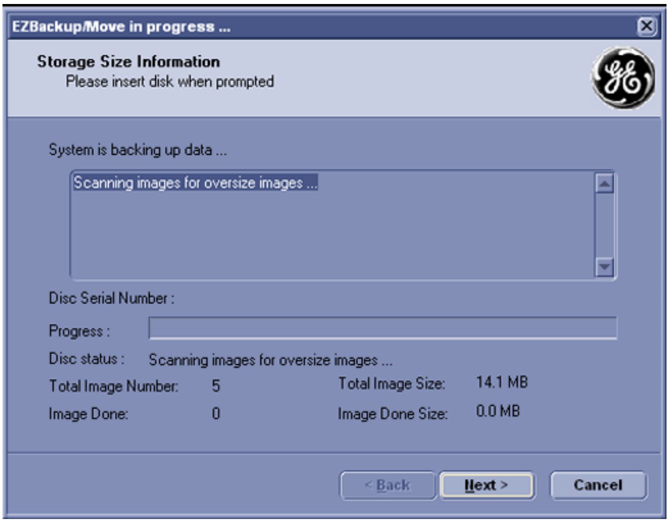
Date	Scanner ID Name	Backup Images Y/N	Older than __ Days	Move Images Y/N	Media Label (and Scanner ID)

NOTE: You cannot cancel the backup/move at any time.

NOTE: This message appears if you press Next without inserting the backup media: "Please insert a blank media...". Insert the media and continue.

EZBackup/EZMove (continued)

7. The status menu appears. When the backup/move has been completed, press *Next*.



EZBackup/Move in progress ...

Storage Size Information

Please insert disk when prompted

System is backing up data ...

Scanning images for oversize images ...

Disc Serial Number :

Progress :

Disc status : Scanning images for oversize images ...

Total Image Number: 5

Total Image Size: 14.1 MB

Image Done: 0

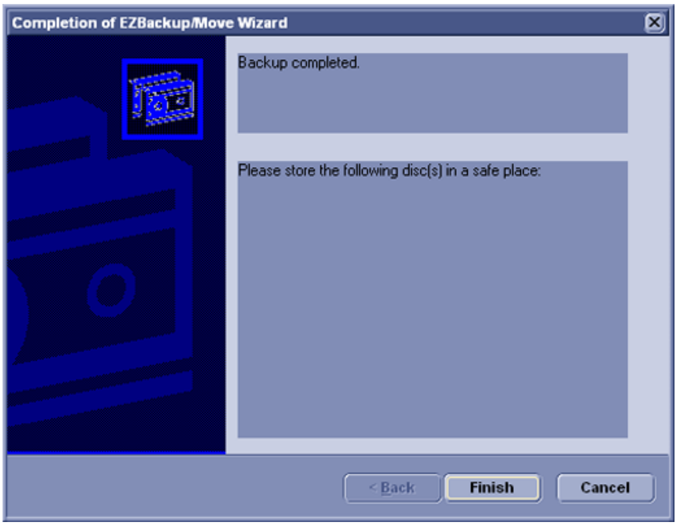
Image Done Size: 0.0 MB

Figure 16-15. EZBackup Wizard Page 3

NOTE: *When/if you need to insert the next media, a message appears providing you with the media label. Label the media, then insert the next media and press OK.*

EZBackup/EZMove (continued)

8. When the backup is complete, the completed wizard page appears. Press *Finish*.


Completion of EZBackup/Move Wizard

Backup completed.

Please store the following disc(s) in a safe place:

Figure 16-16. EZBackup/EZMove Wizard, Page 4

9. Do a patient archive after each EZBackup/EZMove (move).

NOTE: Use Import to restore EZBackup images.

CAUTION

NEVER restore the patient archive from media made previous to the last move. You can still do a backup/move daily; but ALWAYS do a patient archive backup after each move.

To View Backed Up/Moved Images

You can view backed up media via the Patient Menu, Import, and the DICOM CD View dataflow.

1. Select the patient on the Patient Menu (on the same system where the backup/move was performed).
2. Insert the media volume indicated on the Patient Menu.
3. View the exam from the media.

NOTE: You may need to insert a media volume prior to or after the recommended media.

NOTE: If the patient is split over multiple media, images on the previous or next media are displayed as triangles.

NOTE: To view the whole patient on the system, use Import, from as many media as you have for that patient. However, take care not to import studies over existing studies; duplicate or missing images may result. Delete the existing exam first.

Restore procedure: patient data

⚠ CAUTION

The restore procedure overwrites the existing database on the local hard drive. Make sure to insert the correct media.

You cannot restore the data between systems with different software versions.

1. Insert the Backup/Restore media into the media drive.
2. On the Control Panel, press **Utility**.
3. Select ***System***.
4. On the monitor display, select Backup/Restore. The Backup/Restore screen is displayed.

NOTE: *If you are not logged in with administrator privileges, the Operator Login window is displayed. Log on with administrator privileges.*

5. In the Restore list, select Patient Archive.
6. In the Media field, select the Backup/Restore media.
7. Select Restore.

   The system performs the restore. As it proceeds, status information is displayed on the Backup/Restore screen.

Backup and restore strategy: user-defined configurations

In addition to generating a safety copy, the backup/restore function of the user-defined configuration (presets) can be used to configure several LOGIQ e systems with identical presets (preset synchronization).

Preset synchronization

The procedure for preset synchronization of several scanners is as follow:

1. Make a backup of the user-defined configurations on a removable media from a fully configured LOGIQ e system.
2. Restore user-defined configurations from the removable media to another LOGIQ e system (you can restore all the user-defined presets or select specific presets to restore via Detailed Restore).

Backup procedure: user-defined configurations

△ CAUTION

To avoid the risk of overwriting the local patient archives on the system to update, DO NOT check Patient Archive when making a backup of configuration settings.

1. Insert media into the media drive.
2. On the Control Panel, press **Utility**.
3. Select ***System***.
4. On the monitor display, select Backup/Restore.

   The Backup/Restore screen is displayed.

   NOTE: If you are not logged in with administrator privileges, the Operator Login window is displayed. Log on with administrator privileges.

5. In the Backup list, select User Defined Configuration.
6. In the Media field, select media type.
7. Select Backup.

   The system performs the backup. As it proceeds, status information is displayed on the Backup/Restore screen.

8. After the backup is complete, press ***F3*** to eject the media.

Restore procedure: user-defined configurations

△CAUTION The restore procedure overwrites the existing database on the local hard drive. Make sure to insert the correct media.

DO NOT restore data between systems with different software versions.

△CAUTION To avoid the risk of overwriting the local patient archives, DO NOT check Patient Archive when restoring user-defined configurations.

1. Insert the media with the user-defined configurations into the appropriate drive.
2. On the Control Panel, press **Utility**.
3. Select ***System***.
4. On the monitor display, select Backup/Restore.

   The Backup/Restore screen is displayed.

NOTE: If you are not logged in with administrator privileges, the Operator Login window is displayed. Log on with administrator privileges.

5. In the Restore list, select from the following, depending on which configurations you want to restore:
   - User Defined Configuration,

     OR, in the Detailed Restore section select one of the following:
   - Imaging Presets
   - Connectivity Configuration
   - Measurement Configuration
   - Comment/Body Pattern Configuration
   - All Others
6. In the Media field, select the system and user-defined configurations media.
7. Select Restore.

   The system performs the restore. As it proceeds, status information is displayed on the System/Backup/Restore screen. The system restarts.

System/Peripherals Preset Menu

The System/Peripherals screen allows you to specify video and system setup parameters.

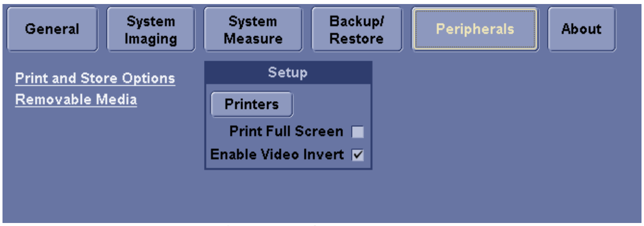

General
System Imaging
System Measure
Backup/ Restore
Peripherals
About
Print and Store Options
Removable Media
Setup
Printers
Print Full Screen ☐
Enable Video Invert ☑

Figure 16-17. System/Peripherals Preset Menu

Print and Store Options. Press Print and Store Options to go to the Utility --> Connectivity --> Miscellaneous setup page.

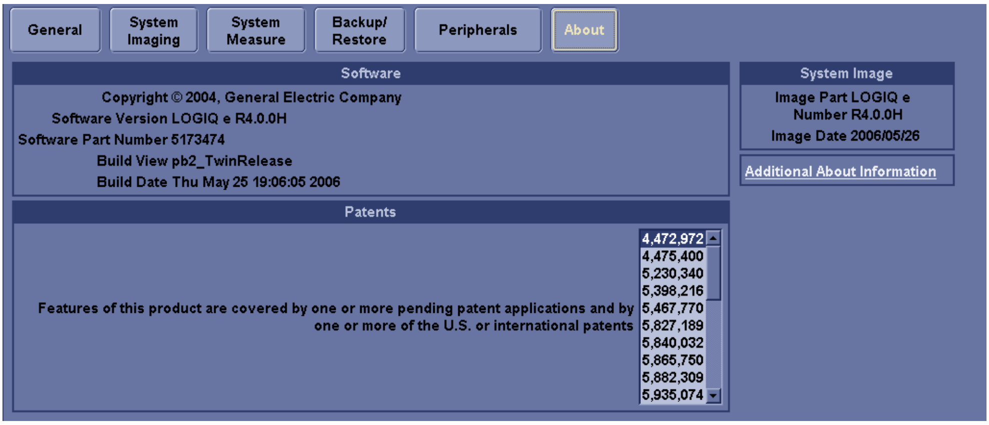
Removable Media. Press Removable Media to go to the Utility --> Connectivity --> Removable Media page.

Table 16-21: Setup

Preset Parameter	Description
Printers	Press this key to add an additional standard printer via the USB serial port and to configure digital printers. This activates the Windows Add Printer wizard. NOTE: Most printer drivers are available via Windows; however, newer printers may require you to load the manufacturer-supplied print driver (must be on CD-ROM). Refer to the Basic Service Manual for more information. To exit this wizard, click anywhere outside of the wizard box.
Print Full Screen	Select this if you want the standard printer to print the full screen.
Enable Video Invert	Select this is you want the standard printer to print black on white rather than white on black.

System/About Preset Menu

The System/About screen lists information about the system software.


General
System Imaging
System Measure
Backup/ Restore
Peripherals
About
Software
System Image
Patents
Additional About Information

Copyright © 2004, General Electric Company
Software Version LOGIQ e R4.0.0H
Software Part Number 5173474
Build View pb2_TwinRelease
Build Date Thu May 25 19:06:05 2006

Image Part Number LOGIQ e R4.0.0H
Image Date 2006/05/26

Features of this product are covered by one or more pending patent applications and by one or more of the U.S. or international patents

4,472,972
4,475,400
5,230,340
5,398,216
5,467,770
5,827,189
5,840,032
5,865,750
5,882,309
5,935,074

Figure 16-18. System About Preset Menu

Table 16-22: Software

Preset Parameter	Description
Software Version	The current software version on this system.
Software Part Number	The software part number.
Build View	The software build view.
Build Date	The software build date.

Table 16-23: System Image

Preset Parameter	Description
Image Part Number	The image part number (ghost part number).
Image Date	The image date (ghost date).

Table 16-24: Patents

Preset Parameter	Description
Patents	Lists system patents.

Imaging Presets

Overview

Imaging screens allow you to specify parameters for the following:

- B-Mode (B)
- Color Flow Mode (CF)
- Power Doppler Imaging (PDI)
- M-Mode (M)
- Anatomical M-Mode (AMM)
- Pulse Wave Mode (PW)
- Continuous Wave Mode (CW)
- Harmonics (HAR)
- General

Changing imaging presets

To change imaging presets:

1. On the Control Panel, select **Utility**.
2. Select ***Imaging***.

   The system displays the Imaging screens. See the Imaging screens on the following pages.
3. In the Preset list, select the exam.
4. In the Probe list, select the probe.
5. In the row across the top of the screen, select the mode.

   The system displays two sets of parameters and settings. The left column lists all settings for the exam (for example, Abdomen). The right column lists settings that apply only to the exam and probe combination.
6. To change a parameter, do one of the following:
   - Select the value from a list
   - Select one value from a choice of two or more buttons
   - Select or clear a check box
7. After changing the parameters, to save the changes, select the Save button.

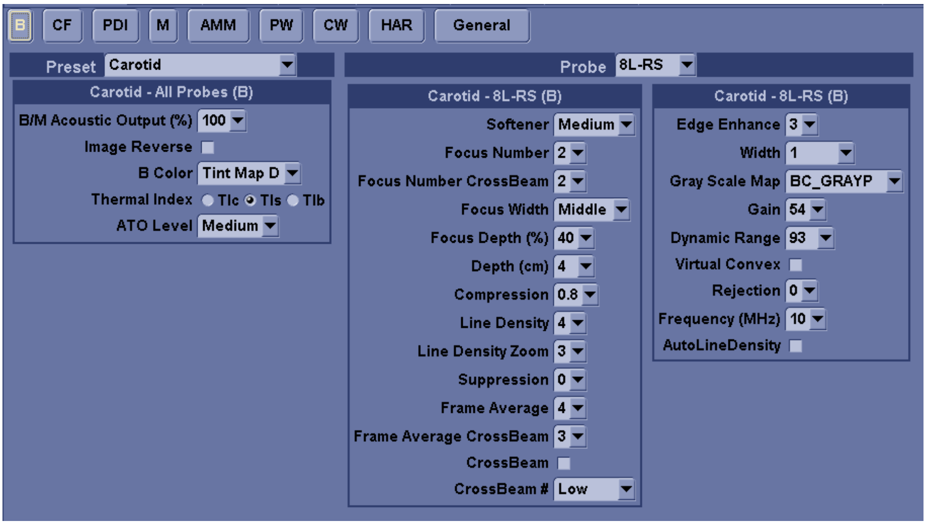
NOTE: When you Save changes to imaging parameters, the system saves changes to all modes, not just the mode currently displayed.

NOTE: If you have problems with imaging, you can return parameters back to the original settings. Select the exam, probe, and mode, and then select Reload Factory Defaults. The system returns the selected parameters to the original settings.

For information about the specific parameters, refer to Chapter 5 Optimizing the Image.

Imaging Presets

B-Mode



Preset: Carotid
Probe: 8L-RS

Carotid - All Probes (B)

B/M Acoustic Output (%): 100
Image Reverse: ☐
B Color: Tint Map D
Thermal Index: ○ TIc ● TIs ○ TIb
ATO Level: Medium

Carotid - 8L-RS (B)

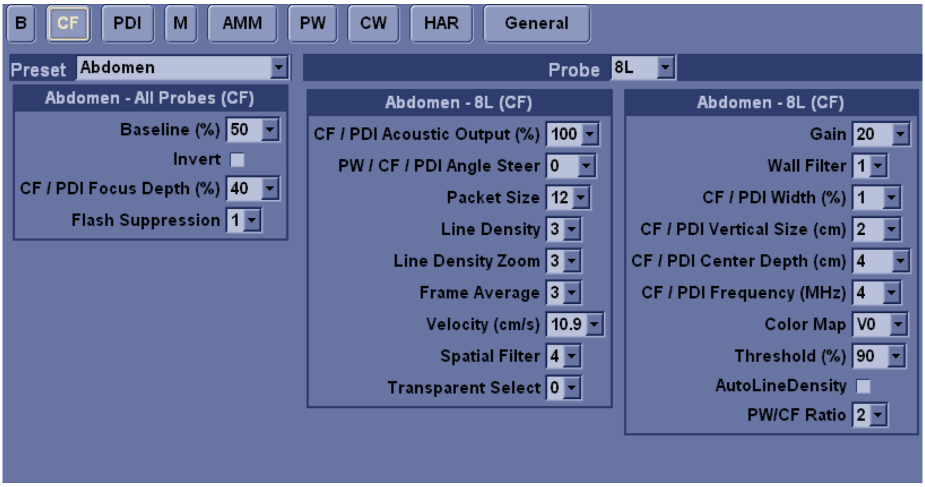
Softener: Medium
Focus Number: 2
Focus Number CrossBeam: 2
Focus Width: Middle
Focus Depth (%): 40
Depth (cm): 4
Compression: 0.8
Line Density: 4
Line Density Zoom: 3
Suppression: 0
Frame Average: 4
Frame Average CrossBeam: 3
CrossBeam: ☐
CrossBeam #: Low

Carotid - 8L-RS (B)

Edge Enhance: 3
Width: 1
Gray Scale Map: BC_GRAYP
Gain: 54
Dynamic Range: 93
Virtual Convex: ☐
Rejection: 0
Frequency (MHz): 10
AutoLineDensity: ☐

Figure 16-19. B-Mode parameters

Color Flow Mode



Preset: Abdomen
Probe: 8L

Abdomen - All Probes (CF)

Baseline (%): 50
Invert: ☐
CF / PDI Focus Depth (%): 40
Flash Suppression: 1

Abdomen - 8L (CF)

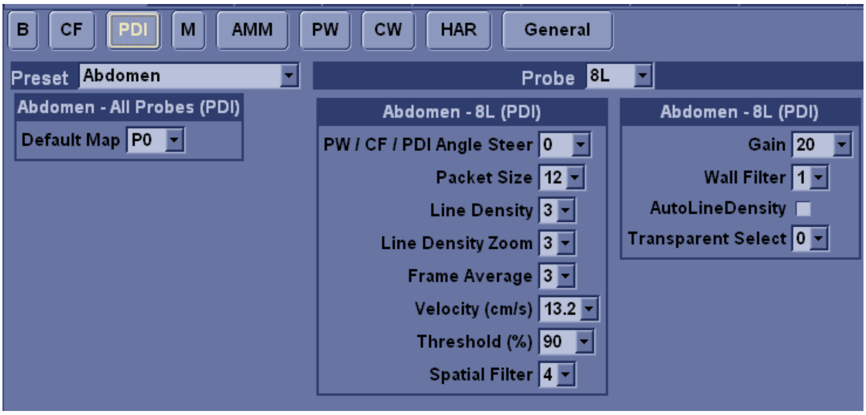
CF / PDI Acoustic Output (%): 100
PW / CF / PDI Angle Steer: 0
Packet Size: 12
Line Density: 3
Line Density Zoom: 3
Frame Average: 3
Velocity (cm/s): 10.9
Spatial Filter: 4
Transparent Select: 0

Abdomen - 8L (CF)

Gain: 20
Wall Filter: 1
CF / PDI Width (%): 1
CF / PDI Vertical Size (cm): 2
CF / PDI Center Depth (cm): 4
CF / PDI Frequency (MHz): 4
Color Map: V0
Threshold (%): 90
AutoLineDensity: ☐
PW/CF Ratio: 2

Figure 16-20. Color Flow parameters

Power Doppler Imaging (PDI)



Preset Abdomen

Probe 8L

Abdomen - All Probes (PDI)

Default Map P0

Abdomen - 8L (PDI)

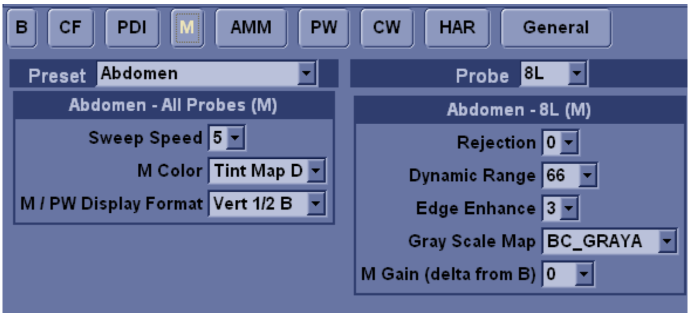
PW / CF / PDI Angle Steer 0
Packet Size 12
Line Density 3
Line Density Zoom 3
Frame Average 3
Velocity (cm/s) 13.2
Threshold (%) 90
Spatial Filter 4

Abdomen - 8L (PDI)

Gain 20
Wall Filter 1
AutoLineDensity ☐
Transparent Select 0

Figure 16-21. PDI parameters

M-Mode



Preset Abdomen

Probe 8L

Abdomen - All Probes (M)

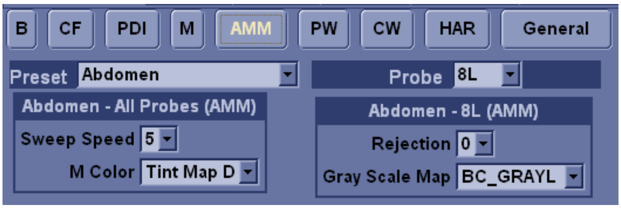
Sweep Speed 5
M Color Tint Map D
M / PW Display Format Vert 1/2 B

Abdomen - 8L (M)

Rejection 0
Dynamic Range 66
Edge Enhance 3
Gray Scale Map BC_GRAYA
M Gain (delta from B) 0

Figure 16-22. M-Mode parameters

Anatomical M-Mode



Preset Abdomen

Probe 8L

Abdomen - All Probes (AMM)

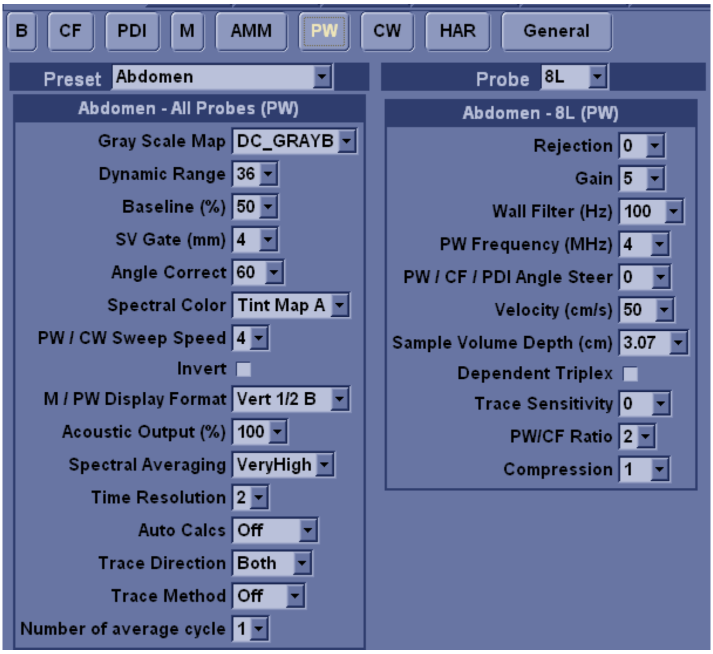
Sweep Speed 5
M Color Tint Map D

Abdomen - 8L (AMM)

Rejection 0
Gray Scale Map BC_GRAYL

Figure 16-23. Anatomical M-Mode parameters

Pulse Wave



Preset: Abdomen

Probe: 8L

Abdomen - All Probes (PW)

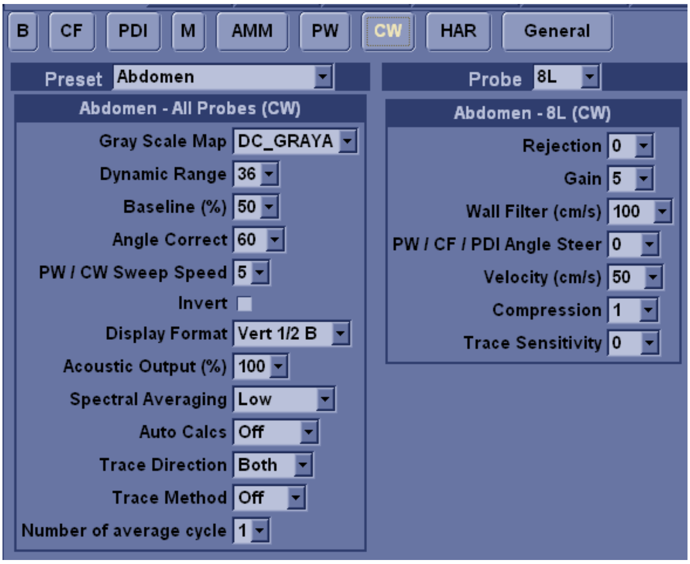
Gray Scale Map: DC_GRAYB
Dynamic Range: 36
Baseline (%): 50
SV Gate (mm): 4
Angle Correct: 60
Spectral Color: Tint Map A
PW / CW Sweep Speed: 4
Invert: ☐
M / PW Display Format: Vert 1/2 B
Acoustic Output (%): 100
Spectral Averaging: VeryHigh
Time Resolution: 2
Auto Calcs: Off
Trace Direction: Both
Trace Method: Off
Number of average cycle: 1

Abdomen - 8L (PW)

Rejection: 0
Gain: 5
Wall Filter (Hz): 100
PW Frequency (MHz): 4
PW / CF / PDI Angle Steer: 0
Velocity (cm/s): 50
Sample Volume Depth (cm): 3.07
Dependent Triplex: ☐
Trace Sensitivity: 0
PW/CF Ratio: 2
Compression: 1

Figure 16-24. PW parameters

Continuous Wave



Preset: Abdomen

Probe: 8L

Abdomen - All Probes (CW)

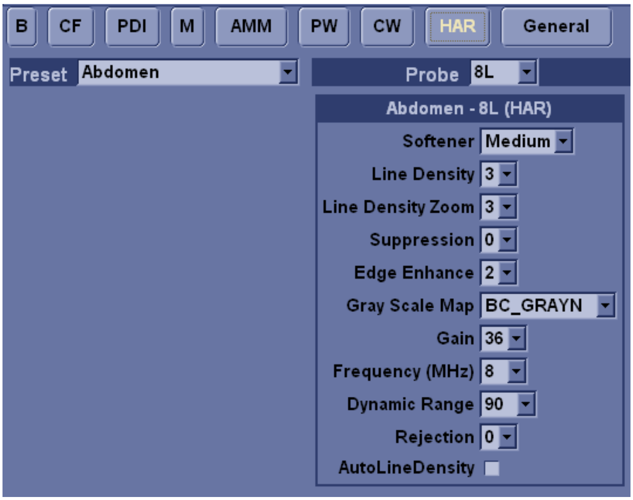
Gray Scale Map: DC_GRAYA
Dynamic Range: 36
Baseline (%): 50
Angle Correct: 60
PW / CW Sweep Speed: 5
Invert: ☐
Display Format: Vert 1/2 B
Acoustic Output (%): 100
Spectral Averaging: Low
Auto Calcs: Off
Trace Direction: Both
Trace Method: Off
Number of average cycle: 1

Abdomen - 8L (CW)

Rejection: 0
Gain: 5
Wall Filter (cm/s): 100
PW / CF / PDI Angle Steer: 0
Velocity (cm/s): 50
Compression: 1
Trace Sensitivity: 0

Figure 16-25. CW parameters

Harmonics



Preset: Abdomen

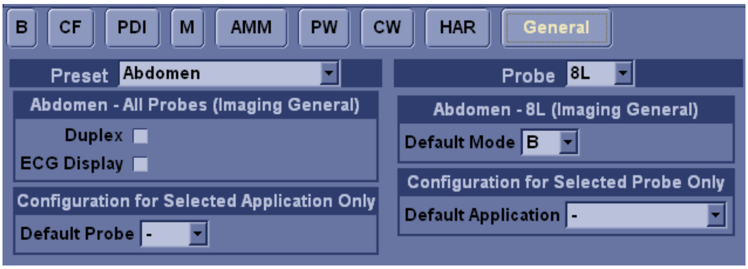
Probe: 8L

Abdomen - 8L (HAR)

Softener: Medium
Line Density: 3
Line Density Zoom: 3
Suppression: 0
Edge Enhance: 2
Gray Scale Map: BC_GRAYN
Gain: 36
Frequency (MHz): 8
Dynamic Range: 90
Rejection: 0
AutoLineDensity: ☐

Figure 16-26. Harmonics parameters

General



Preset: Abdomen

Abdomen - All Probes (Imaging General)

Duplex: ☐
ECG Display: ☐

Configuration for Selected Application Only

Default Probe: -

Probe: 8L

Abdomen - 8L (Imaging General)

Default Mode: B

Configuration for Selected Probe Only

Default Application: -

Figure 16-27. General parameters

You can specify a default probe per application and a default application per probe.

Default probe per application

1. To specify a default probe per application, select Utility --> Imaging --> General.
2. Under Preset, specify the desired probe from the pull-down menu.

Default probe per application

1. To specify a default application per probe, select Utility --> Imaging --> General.
2. Under Probe, specify the desired application from the pull-down menu.

Comments Libraries Presets

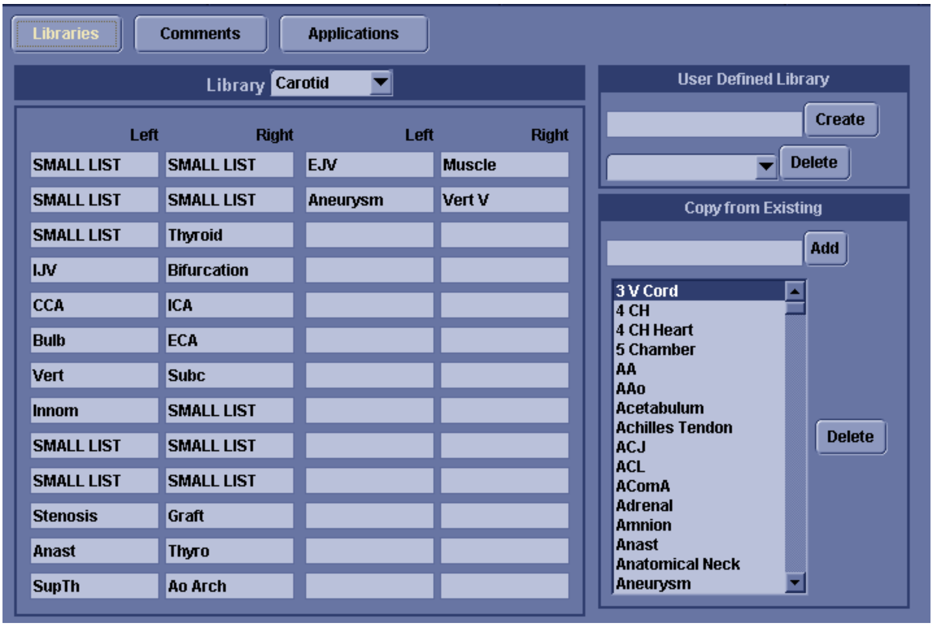
Overview

Comment screens allow you to specify comment text and pointer options, to define comment libraries, and assign comment libraries to applications.

Comments Libraries/Libraries Preset Menu

On the comments *Libraries* tab, you can change and create comment libraries. A comment library is a list of comments that are associated with a specific application. The comments are listed in the library in the order in which they display on the Comment Menu on the screen. For each library, you can define two columns of comments for both the left and right sides, with 13 rows available for each column.

Comments Libraries/Libraries Preset Menu (continued)


Libraries
Comments
Applications
User Defined Library
Create
Delete
Copy from Existing
Add
Delete

Library: Carotid

Left	Right	Left	Right
SMALL LIST	SMALL LIST	EJV	Muscle
SMALL LIST	SMALL LIST	Aneurysm	Vert V
SMALL LIST	Thyroid		
IJV	Bifurcation		
CCA	ICA		
Bulb	ECA		
Vert	Subc		
Innom	SMALL LIST		
SMALL LIST	SMALL LIST		
SMALL LIST	SMALL LIST		
Stenosis	Graft		
Anast	Thyro		
SupTh	Ao Arch		

3 V Cord
4 CH
4 CH Heart
5 Chamber
AA
AAo
Acetabulum
Achilles Tendon
ACJ
ACL
AComA
Adrenal
Amnion
Anast
Anatomical Neck
Aneurysm

Figure 16-28. Comment Libraries Preset Menu

Table 16-25: Libraries

Preset Parameter	Description
Library	The name of the comment library.
Left and Right Columns	The list of comments for the select library separated by side.
User Defined Library	The name of a new comment library that you want to create/delete.
Copy from Existing	A list of comments you can use to create a library.

Deleting a user defined library

1. Select the library name which you want to delete from the pull-down menu.
2. Press ***Delete***.
3. Press ***Save*** to save the changes.

Defining Comments

1. In the *Library* field, select the library you want.

   The system displays all comments for the library. You can have two Top/Sub Menu displays of comments for each library. The comments are listed in the order that they are shown on the Top/Sub Menu when you use comments.
2. To change or add an comment, select the comment or blank location and press **Set**, then do one of the following:
   - Type the comment.
   - Select the comment in the *Copy from Existing* list, and press **Set**.
3. To save the changes, select the Save button.

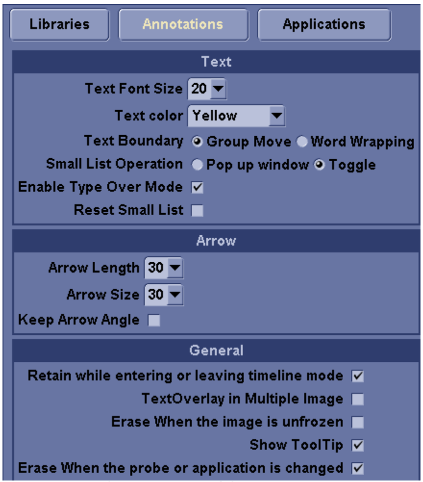
Creating a new comments library

1. In the *User Defined Library* field, type a name for the library, then select Create.

   The system creates a new library.
2. Enter comments as described in step 2 above.
3. To save the changes, select the Save button.

Comments Libraries/Comments Preset Menu

On the Comments tab, you specify text and pointer options.



Text

Text Font Size 20

Text color Yellow

Text Boundary ● Group Move ○ Word Wrapping

Small List Operation ○ Pop up window ● Toggle

Enable Type Over Mode ☑

Reset Small List ☐

Arrow

Arrow Length 30

Arrow Size 30

Keep Arrow Angle ☐

General

Retain while entering or leaving timeline mode ☑

TextOverlay in Multiple Image ☐

Erase When the image is unfrozen ☐

Show ToolTip ☑

Erase When the probe or application is changed ☑

Figure 16-29. Comment/Comments Preset Menu

Table 16-26: Text

Preset Parameter	Description
Text Font Size	Specify the font size. The font size increases as the number increases.
Text color	Select the color for comment text.
Text Boundary	Select Group Move or Word Wrapping.
Small List Operation	Select whether you want small list options to display in a pop-up window or by a toggle function.
Enable Type Over Mode	Select to type over existing comments. Position the cursor over the text to be changed, then start typing.
Reset Small List	Select to indicate that small lists should not be reset to the first item.

Comments Libraries/Comments Preset Menu (continued)

Table 16-27: Arrow

Preset Parameter	Description
Arrow Length	Select the default pointer length.
Arrow Size	Select the default pointer size.

Table 16-28: General

Preset Parameter	Description
Retain while entering or leaving timeline mode	If selected, the system keeps the comment(s) on the monitor display when you enter or leave timeline mode.
TextOverlay in Multiple Image	When selected, and you select the F8 key to hide or show comments, if you are in multiple image, the system hides the text in both images. When cleared, the system only hides the text for the active image.
Erase When the image is unfrozen	Deletes comments when you unfreeze the image.

After you change comment options, select *Save* to save the changes.

Comments Libraries/Applications Preset Menu

The Comments Libraries/Applications tab is a link to the Applications preset menu. The Applications preset screen allows you to specify which libraries belong to an application. You also specify which is the default library that displays when you use comments.

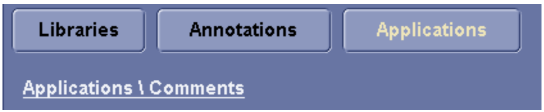
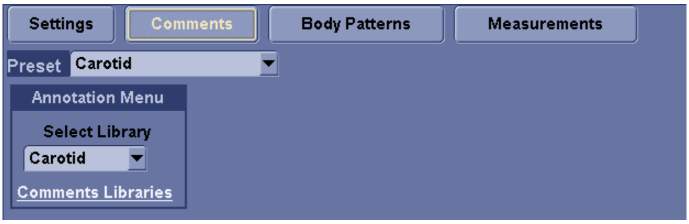

Libraries
Annotations
Applications
Applications \ Comments

Figure 16-30. Applications/Comments Link

The Applications/Comments screen can be accessed through either the Comments Libraries or Applications Top/Sub Menu keys.


Settings
Comments
Body Patterns
Measurements
Annotation Menu
Select Library
Comments Libraries

Preset Carotid

Carotid

Figure 16-31. Applications/Comments Preset Menu

Table 16-29: Applications

Preset Parameter	Description
Preset	The name of the application preset.
Tabs	A list of libraries for the application. You can select up to six libraries.
Default Tab	The default library that the system displays when you use comments.

Specifying which libraries belong to an application

1. On the Applications tab, in the Application field, select the application.
2. In the Library Group Tabs fields, select the libraries for this application. You can select up to six libraries.
3. In the Default Library Group field, select the default library you want the system to display when you use comments.

NOTE: *When you use comments, the default library is displayed. To use other libraries for the application, press the tab for the library.*

4. To save the changes, select the Save button.

Using comments from a library

To use comments, press the **Comment** key on the Control Panel. Comments are then displayed on the Top/Sub Menu.

To select a comment library, press the appropriate tab (e.g. the tabs are OB23 and OB23_1).

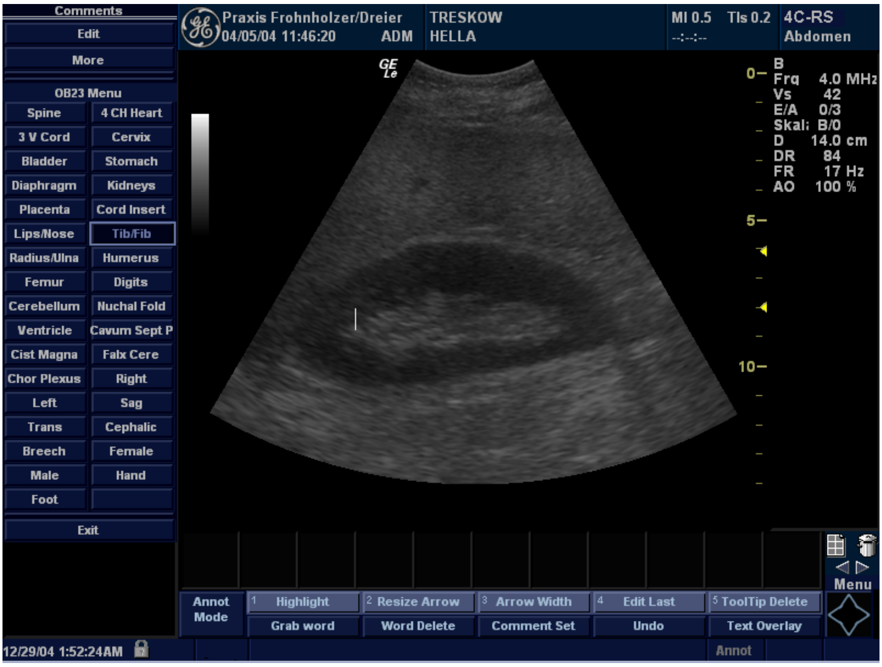

Comments
Edit
More
OB23 Menu
Spine
4 CH Heart
3 V Cord
Cervix
Bladder
Stomach
Diaphragm
Kidneys
Placenta
Cord Insert
Lips/Nose
Tib/Fib
Radius/Ulna
Humerus
Femur
Digits
Cerebellum
Nuchal Fold
Ventricle
Cavum Sept P
Cist Magna
Falx Cere
Chor Plexus
Right
Left
Sag
Trans
Cephalic
Breech
Female
Male
Hand
Foot
Exit
12/29/04 1:52:24AM
Praxis Frohnholzer/Dreier
04/05/04 11:46:20
ADM
TRESKOW
HELLA
MI 0.5
TIs 0.2
4C-RS
Abdomen
B
Frq 4.0 MHz
Vs 42
E/A 0/3
Skal: B/0
D 14.0 cm
DR 84
FR 17 Hz
AO 100 %
0
5
10
Menu
Annot Mode
1 Highlight
2 Resize Arrow
3 Arrow Width
4 Edit Last
5 ToolTip Delete
Grab word
Word Delete
Comment Set
Undo
Text Overlay
Annot

Figure 16-32. OB 2/3 Comments Top/Sub Menu

Body Patterns Presets

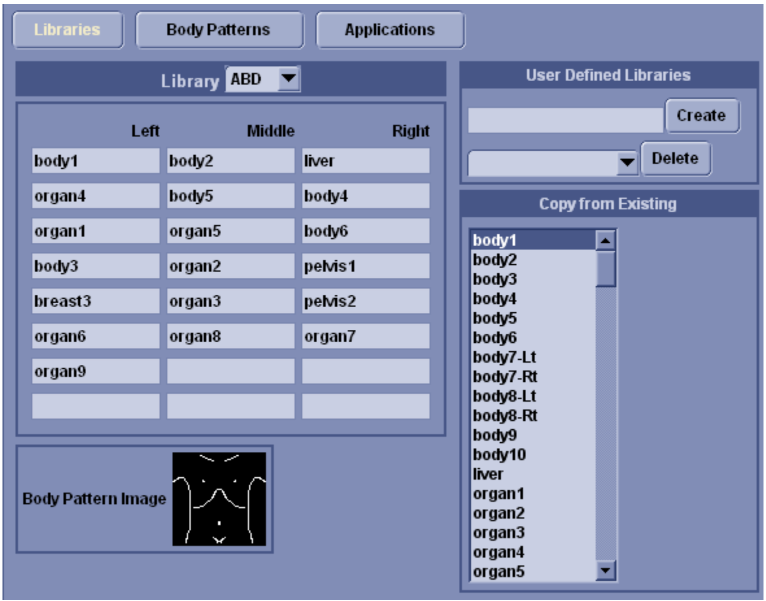
Overview

Body patterns screens allow you to specify body pattern options, to define body pattern libraries, and assign body pattern libraries.

Body Pattern Libraries/Libraries Preset Menu

On the Body Patterns Libraries tab, you can change and create body pattern libraries. A body pattern library is a list of body patterns that are associated with a specific application. The body patterns are listed in the library in the order in which they display on the screen. For each library, you can define three columns of body pattern, with 8 rows in each column.

Body Pattern Libraries/Libraries Preset Menu (continued)


Libraries
Body Patterns
Applications
User Defined Libraries
Create
Delete
Copy from Existing
Body Pattern Image

Library ABD

Left	Middle	Right
body1	body2	liver
organ4	body5	body4
organ1	organ5	body6
body3	organ2	pelvis1
breast3	organ3	pelvis2
organ6	organ8	organ7
organ9		

Copy from Existing:

body1
body2
body3
body4
body5
body6
body7-Lt
body7-Rt
body8-Lt
body8-Rt
body9
body10
liver
organ1
organ2
organ3
organ4
organ5

Figure 16-33. Body Patterns Libraries Preset Menu

Table 16-30: Body Patterns Libraries

Preset Parameter	Description
Library	The name of the body pattern application library.
Left, Middle and Right Columns	The list of body patterns for the selected library.
Body Pattern Image	Displays the image of the currently selected body pattern.
User Defined Library	Allows the selection of the user defined library to be created/deleted.
Copy from Existing	A list of body patterns you can use to create an application library.

Defining body patterns

1. In the *Library* field, select the application library you want.

   The system displays all body patterns for the library. You can have two Top/Sub Menu displays of body patterns for each library. The body patterns are listed in the order that they are shown on the Top/Sub Menu.
2. To change or add a body pattern, select the body pattern or blank location and press **Set**, then do one of the following:
   - Type the body pattern name.
   - Select the body pattern in the *Copy from Existing* list, and press **Set**.

NOTE: *When you select a body pattern name in a Top/Sub Menu location or in the Copy from Existing list, the system displays the pattern in the lower left corner of the screen.*

3. To save the changes, select the Save button.

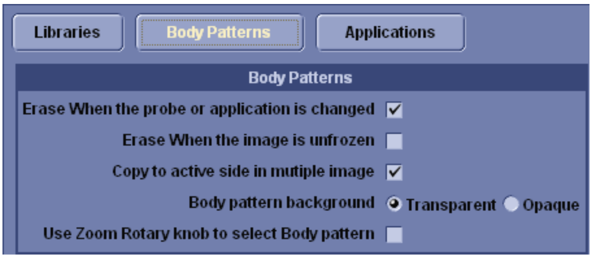
Creating a new body pattern library

1. In the New Library field, type a name for the library, then select Create.

   The system creates a new library.
2. Enter body patterns as described in step 2 above.
3. To save the changes, select the Save button.

Body Pattern Libraries/Body Patterns Preset Menu

On the Body Patterns tab, you specify body pattern options.



Erase When the probe or application is changed ☑
Erase When the image is unfrozen ☐
Copy to active side in mutiple image ☑
Body pattern background ● Transparent ○ Opaque
Use Zoom Rotary knob to select Body pattern ☐

Figure 16-34. Body Patterns General Preset Menu

Table 16-31: Body Patterns

Preset Parameter	Description
Erase When the probe or application is changed	If checked, when you change probes or applications, the system erases the body pattern.
Erase When the image is unfrozen	If checked, when you unfreeze the image, the system erases the body pattern.
Copy to active side in multiple image	If checked, when you use dual B-Mode, the system copies the body pattern to the active side of the dual image.
Body pattern background	Select whether you want the body pattern background to be Transparent or Opaque.

After you change body pattern options, select Save to save the changes.

Body Pattern Libraries/Applications Preset Menu

The Body Patterns Library/Applications tab is a link to the Applications preset menu. The Body Patterns Applications tab allows you to select body pattern application libraries. You also specify which is the default library that displays when you use body patterns.

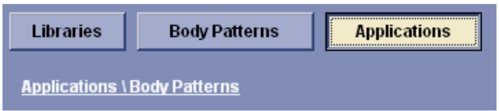

Libraries
Body Patterns
Applications
Applications \ Body Patterns

Figure 16-35. Applications/Body Patterns Link

The Applications/Body Patterns screen can be accessed through either the Body Pattern Libraries or Applications Top/ Sub Menu keys.

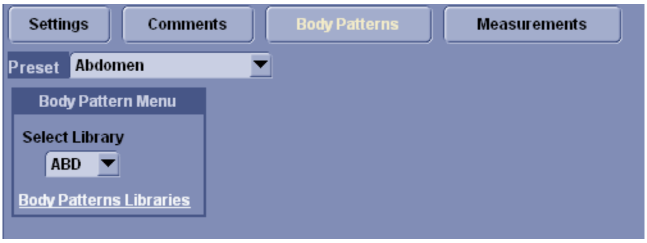

Settings
Comments
Body Patterns
Measurements
Preset
Abdomen
Body Pattern Menu
Select Library
ABD
Body Patterns Libraries

Figure 16-36. Body Patterns Applications Preset Menu

Table 16-32: Applications

Preset Parameter	Description
Application	Defines the Body Pattern option.

Selecting body pattern application libraries

1. On the Applications tab, in the Application field, select the body pattern.
2. In the Library Group Tabs fields, select the application libraries for Body Patterns. You can select up to six libraries.
3. In the Default Library Group field, select the default application library you want the system to display when you use body patterns.

NOTE: *When you use body patterns, the default library is displayed. To use other application libraries, press the tab for the library.*

4. To save the changes, select the Save button.

Using body pattern application libraries

See the following Body Patterns Small Parts Top/Sub Menu.

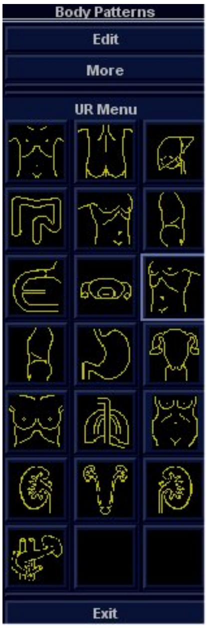


Figure 16-37. Body Patterns OB-2/3 Menu

To select a body pattern library, select the tabs (for example, ABD or OB).

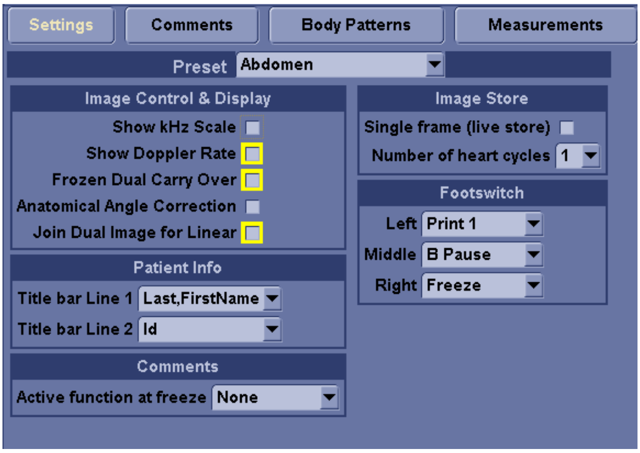
To select body patterns, use the **Ellipse/Body Pattern** control on the Control Panel.

Application Presets

Overview

Application Settings presets allow you to configure the application-specific settings (presets).

The other two tabs, Comments and Body Patterns were described earlier in this chapter.



Preset: Abdomen

Image Control & Display

Show kHz Scale ☐
Show Doppler Rate ☐
Frozen Dual Carry Over ☐
Anatomical Angle Correction ☐
Join Dual Image for Linear ☐

Patient Info

Title bar Line 1: Last,FirstName
Title bar Line 2: Id

Comments

Active function at freeze: None

Image Store

Single frame (live store) ☐
Number of heart cycles: 1

Footswitch

Left: Print 1
Middle: B Pause
Right: Freeze

Figure 16-38. Application Settings Preset Menu

Overview (continued)

Table 16-33: Preset

Preset Parameter	Description
Preset	Select the application that you want to specify the presets. Along with the various applications available on the system, there are four user-defined application presets that can be set. See 'User-Defined Application Presets' on *page 4-27 for more information.*

Table 16-34: Image Control & Display

Preset Parameter	Description
Show kHz scale	When selected, displays the kHz scale on the left side of the Doppler spectrum.
Show Doppler Rate	When selected, displays the Doppler rate (mm/s) below the Doppler spectrum.
Frozen Dual Carry Over	Select to carry over the live image's imaging parameters to the other image after pressing Freeze.
Anatomical Angle Correction	Select to keep the angle constant with regard to the anatomy.
Join Dual Image for Linear	Select to place linear probe dual images directly next to each other.

Overview (continued)

Table 16-35: Patient Info

Preset Parameter	Description
Titlebar Line 1	Select the patient information to display on the scanning screen Title bar.
Titlebar Line 2	Select the patient information to display on the scanning screen Title bar.

Table 16-36: Comments

Preset Parameter	Description
Active function at Freeze	Select None, Body Pattern, or Comments. If Body Pattern or Comment is selected, the Body Pattern or Comment is activated automatically when freezing the system.

Table 16-37: Image Store

Preset Parameter	Description
Single frame (live store)	If selected, stores single frame images only. If not selected, stores cine loop.
Number of heart cycles	Select the number of heart cycles to store. (Must be de-selected for single frame.)

Table 16-38: Footswitch

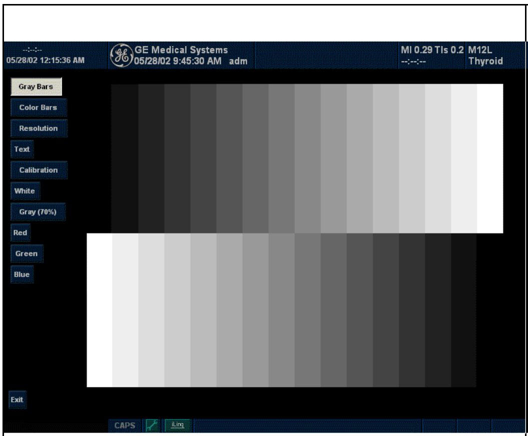
Preset Parameter	Description
Left	Configure the left footswitch pedal for the selected application. Select the functionality from the list.
Middle	Configure the middle footswitch pedal for the selected application. Select the functionality from the list.
Right	Configure the right footswitch pedal for the selected application. Select the functionality from the list.

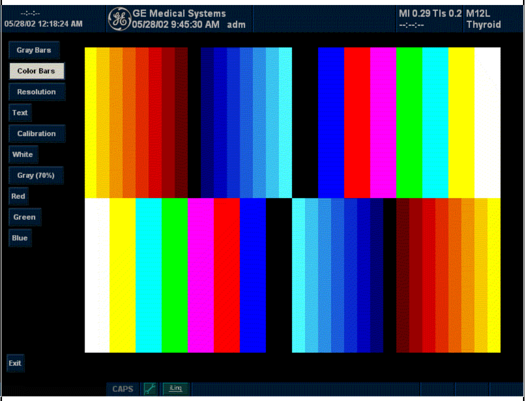
Test Patterns

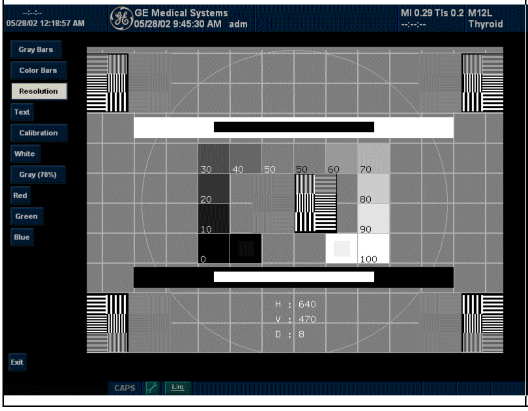
Overview

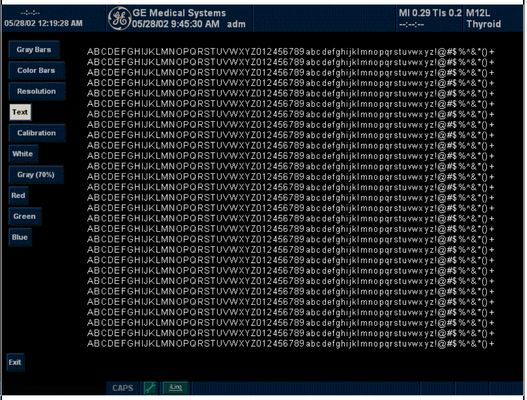
There are different test patterns available: Gray Bars, Color Bars, Resolution, Text, Monitor Calibration, White, Gray, Red, Green and Blue.

Table 16-39: Available Test Patterns


--:--:--
05/28/02 12:15:36 AM
GE Medical Systems
05/28/02 9:45:30 AM adm
MI 0.29 TIs 0.2
--:--:--
M12L
Thyroid
Gray Bars
Color Bars
Resolution
Text
Calibration
White
Gray (70%)
Red
Green
Blue
Exit
CAPS
iLinq


--:--:--
05/28/02 12:18:24 AM
GE Medical Systems
05/28/02 9:45:30 AM adm
MI 0.29 TIs 0.2
--:--:--
M12L
Thyroid
Gray Bars
Color Bars
Resolution
Text
Calibration
White
Gray (70%)
Red
Green
Blue
Exit
CAPS
iLinq


--:--:--
05/28/02 12:18:57 AM
GE Medical Systems
05/28/02 9:45:30 AM adm
MI 0.29 TIs 0.2
--:--:--
M12L
Thyroid
Gray Bars
Color Bars
Resolution
Text
Calibration
White
Gray (70%)
Red
Green
Blue
Exit
30
40
50
50
60
70
20
80
10
90
0
100
H : 640
V : 470
D : 8
CAPS
iLinq

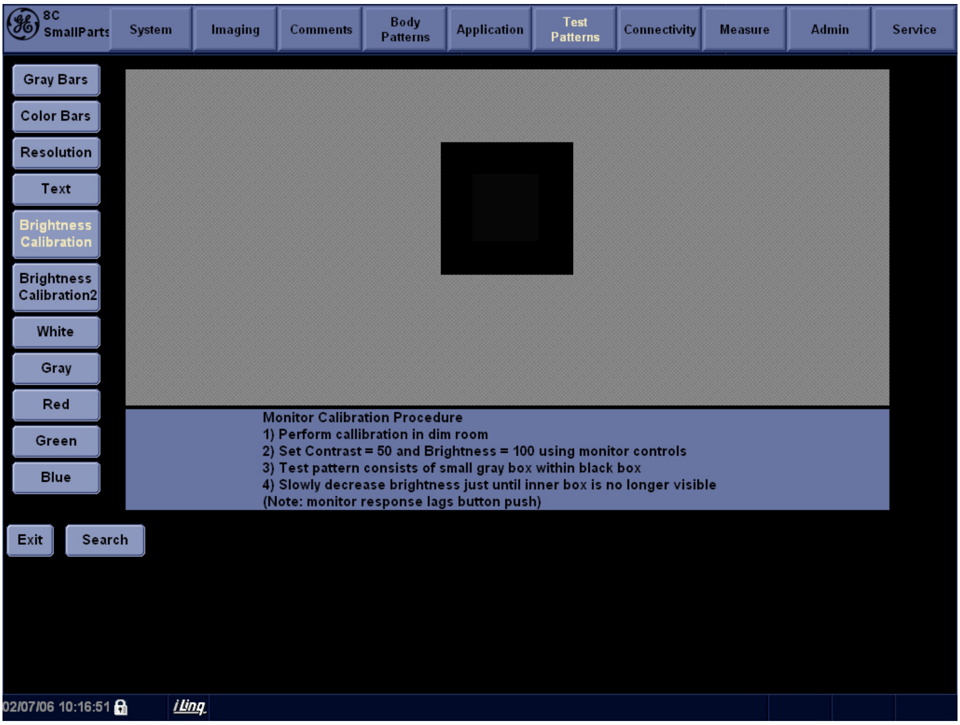

--:--:--
05/28/02 12:19:28 AM
GE Medical Systems
05/28/02 9:45:30 AM adm
MI 0.29 TIs 0.2
--:--:--
M12L
Thyroid
Gray Bars
Color Bars
Resolution
Text
Calibration
White
Gray (70%)
Red
Green
Blue
Exit
CAPS
iLinq

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
ABCDEFGHIJKLMNOPQRSTUVWXYZ012456789abcdefghijklmnopqrstuvwxyz!@#$%^&*()+
```

Brightness Calibration

To calibrate the monitor,

1. Select ***Test Patterns*** from the Utility Top/Sub Menu.; then select Brightness Calibration or Brightness Calibration 2. The test pattern consists of a small box inside a larger box.


8C
SmallParts
System
Imaging
Comments
Body Patterns
Application
Test Patterns
Connectivity
Measure
Admin
Service
Gray Bars
Color Bars
Resolution
Text
Brightness Calibration
Brightness Calibration2
White
Gray
Red
Green
Blue
Exit
Search
02/07/06 10:16:51
iLinq

Monitor Calibration Procedure
1) Perform callibration in dim room
2) Set Contrast = 50 and Brightness = 100 using monitor controls
3) Test pattern consists of small gray box within black box
4) Slowly decrease brightness just until inner box is no longer visible
(Note: monitor response lags button push)

Figure 16-39. Brightness Calibration Test Pattern

2. Press the Brightness/Contrast control on the front of the monitor.
3. Set the Brightness at 100. Then slowly decrease the Brightness until the inner box is no longer visible. Please note that the monitor response to this adjustment lags behind the button push.

NOTE: After you calibrate the monitor you may need to adjust peripheral settings.

Configuring Connectivity

Overview

You use Connectivity functionality to set up the connection and communication protocols for the ultrasound system. This page gives an overview of each of the Connectivity functions. Each function is described in detail in the following pages.

Structured Reporting

DICOM Structured Reporting provides the results of a procedure as structured data elements (well-defined fields) as opposed to unstructured data (large amounts of text undifferentiated by individual fields). This greatly improves query capability. DICOM Structured Reporting creates coded clinical data that can be used for clinical research, outcomes analysis, and disease management.

Connectivity Functions

To set up your institution's connectivity, you must login with administrator privileges.

1. **TCPIP**: allows you to configure the Internet Protocol.
2. **Device**. allows you to set up devices.
3. **Service**: allows you to configure a service (for example, DICOM services such as printers, worklist, and other services such as video print and standard print) from the list of supported services. This means that the user can configure a device with the DICOM service(s) that particular device supports.
4. **Dataflow**: allows you to adjust the settings of the selected dataflow and associated services. Selecting a dataflow customizes the ultrasound system to work according to the services associated with the selected dataflow.
5. **Button**: allows you to assign a pre-configured output service (or a set of output services) to the Print keys on the control panel.
6. **Removable Media**: enables formatting (DICOM, database, or blank formatting) and DICOM verification of removable media.
7. **Miscellaneous**: allows you to set up the patient exam menu options, print and store options, and the order of the columns in the examination list on the Patient menu.

Configure these screens from left to right, starting with the Tcpip tab first.

NOTE: *The ultrasound system is pre-configured for many services, with default settings selected. You can change these services and settings as needed.*

⚠ CAUTION

You must restart the LOGIQ e (shutdown) after making any changes to connectivity settings in the Utility menus. This includes any changes on the TCPIP or dataflow setup screens.

TCPIP

This configuration category enables users with administrative rights to set the TCPIP for the system and connected remote archive.

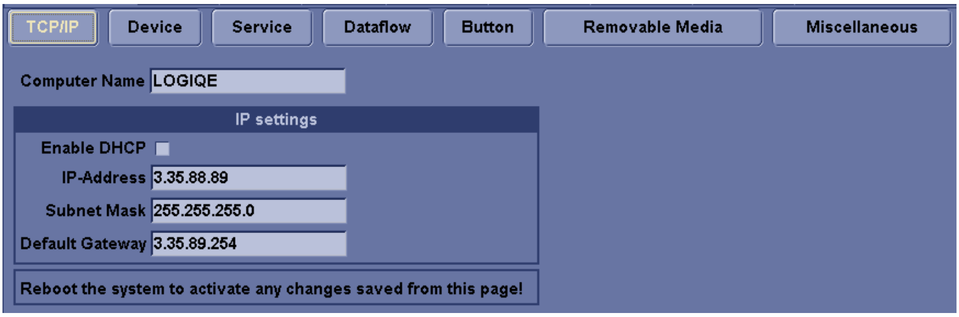
1. Type the name of the Ultrasound system in the Computer Name field.
2. In the IP settings section, identify the ultrasound system to the rest of the network by one of the following:
   - DO NOT enable DHCP.
   - Type the IP-Address (acquire unique static IP address from hospital network administrator), Subnet Mask, and Default Gateway (if applicable).

NOTE: Do not set up the system with DHCP. The IP address MUST BE static for the diagnostic and DICOM to function correctly.

3. Select Save settings.
4. Re-boot the ultrasound system.

NOTE: TCPIP settings do not get restored when restoring backups. This is per system design. The LOGIQ e IP address MUST BE unique.

TCPIP (continued)



Computer Name LOGIQE

Enable DHCP ☐

IP-Address 3.35.88.89

Subnet Mask 255.255.255.0

Default Gateway 3.35.89.254

Reboot the system to activate any changes saved from this page!

Figure 16-40. Connectivity TCPIP Preset Menu

Table 16-40: Computer Name

Preset Parameter	Description
Computer Name	Type the unique name for the Ultrasound system (no spaces in name).

Table 16-41: IP settings

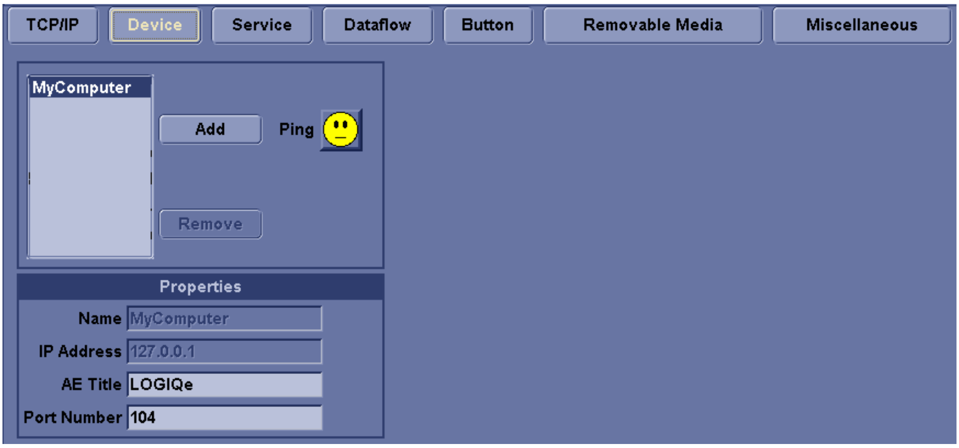
Preset Parameter	Description
Enable DHCP	DO NOT select this box to enable dynamic IP Address selection.
IP-Address	Type the IP Address of the Ultrasound system. NOTE: IP stands for Internet Protocol. Every device on the network has a unique IP address.
Subnet Mask	Type the subnet mask address. NOTE: The Subnet Mask is an IP address filter that eliminates communication/messages from network devices of no interest to your system.
Default Gateway	Type the default gateway address.

NOTE: Reboot the system to activate any changes saved from this page.

Device

To add a new device,

1. Press Add.
2. Type the device name in the Name field.
3. Type the device's IP address in the IP Address field.


TCP/IP
Device
Service
Dataflow
Button
Removable Media
Miscellaneous
MyComputer
Add
Ping
Remove
Properties

Name: MyComputer
IP Address: 127.0.0.1
AE Title: LOGIQe
Port Number: 104

Figure 16-41. Connectivity Device Preset Menu

Table 16-42: Device

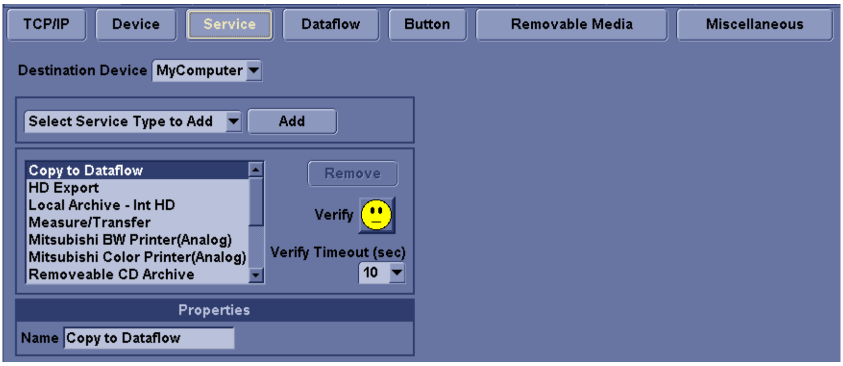
Preset Parameter	Description
Add/Remove	Press Add to add a new device; press Remove to delete a device.
Ping	Press Ping to confirm that a device is connected.
Properties: Name	Type the name of the device.
Properties: IP Address	Type the device's IP address.

To ping a device,

1. Select the device.
2. Press Ping. If the smiley face smiles, then the connection has been confirmed. If the smiley face frowns, then the connection has not been made. Check the device name and IP address.

Service

For each Device that you added to the system, you need to set up the service(s) that device supports (you must be an administrator to update these screens).


TCP/IP
Device
Service
Dataflow
Button
Removable Media
Miscellaneous
Select Service Type to Add
Add
Copy to Dataflow
HD Export
Local Archive - Int HD
Measure/Transfer
Mitsubishi BW Printer(Analog)
Mitsubishi Color Printer(Analog)
Removeable CD Archive
Remove
Verify
Properties

Destination Device MyComputer

Verify Timeout (sec) 10

Name Copy to Dataflow

Figure 16-42. Connectivity Services Preset Menu

The Services screen has the following sections of information:

1. **Destination Device** - lists information about destination devices. You can select from a list of currently existing devices.
2. **Service Type to Add** - lists information about services for the destination device. You can add services, select from a list of currently existing services, and remove services.
3. **Service Parameters** - lists parameters for the service currently selected in the Services section. The name and parameters in this section change, depending on what service is currently selected. In the above figure, this section shows DICOM Print parameters.

Adding a service to a destination device

1. Select the service from the pull-down menu. Press Add.
2. Specify the properties for this service. Press Save.
3. Verify the service.

Removing a service

1. Select the service. Press Remove.
2. Press Save.

Changing parameters for a service

There are certain parameters that may need to be set up for each service:

Table 16-43: Service Parameters: Common Service Parameters

Preset Parameter	Description
Name	Free text: give a descriptive name to the device.
AE Title	The Application Entity Title for the service.
Port Number	The port number of the service.
Maximum Retries	Max # – the maximum number of times to try establishing a connection to the service..
Retry Interval (sec)	Specify how often (in seconds) the system should try to establish a connection to the service.
Timeout	The amount of time after which the system will stop trying to establish a connection to the service.

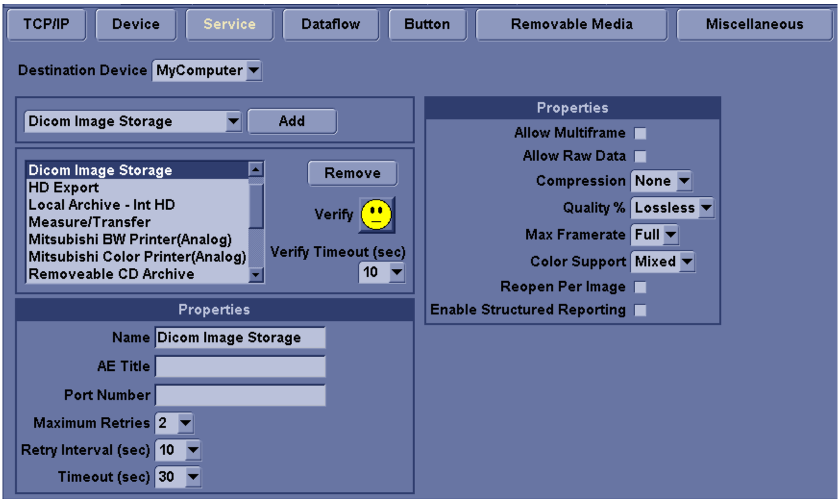
Changing parameters for a service (continued)

Many service parameters are specific to each type of service. The parameters are described on the following pages:

- DICOM Image Storage
- DICOM Performed Procedure
- DICOM Print
- DICOM Query/Retrieve
- DICOM Storage Commitment
- DICOM Worklist
- Echo Database V3.0
- HD Export
- Measure/Transfer
- Standard Print
- USB Quick Save
- Video Capture

DICOM Image Storage

DICOM Image Storage allows the system to send or receive ultrasound images in a format that can be interpreted by PACS.



Destination Device: MyComputer

Dicom Image Storage

Dicom Image Storage
HD Export
Local Archive - Int HD
Measure/Transfer
Mitsubishi BW Printer(Analog)
Mitsubishi Color Printer(Analog)
Removeable CD Archive

Verify Timeout (sec): 10

Name: Dicom Image Storage
AE Title:
Port Number:
Maximum Retries: 2
Retry Interval (sec): 10
Timeout (sec): 30

Allow Multiframe ☐
Allow Raw Data ☐
Compression: None
Quality %: Lossless
Max Framerate: Full
Color Support: Mixed
Reopen Per Image ☐
Enable Structured Reporting ☐

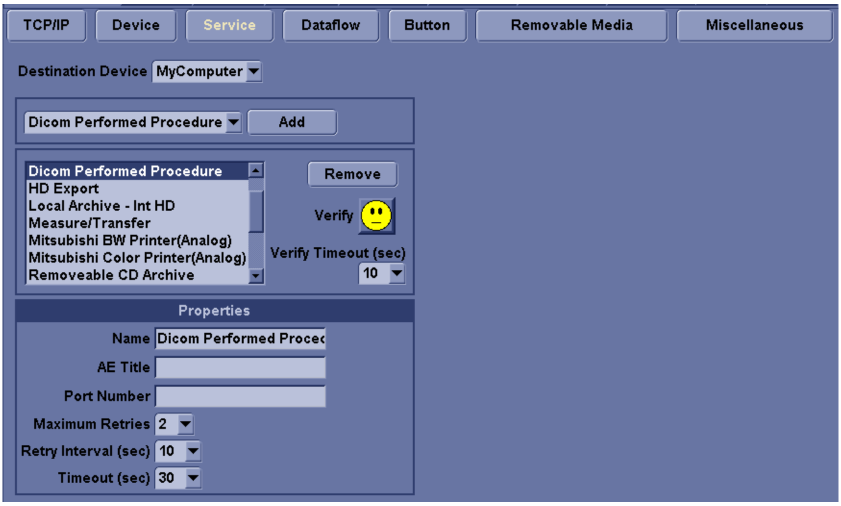
Figure 16-43. DICOM Image Storage Service

Table 16-44: DICOM Image Storage

Preset Parameter	Description
Allow Multiframe	Select to allow cine loop storage.
Allow raw data	Select to save data in both TruAccess (raw data) and DICOM format.Clear to save in DICOM format only.
Compression	Select the compression type: None, Rle, or Jpeg.
Quality %	Set picture quality from 1 to 100% and Lossless. A low picture quality level allows high data compression, while a high picture quality restrains the compression.
Max Framerate	Select the maximum frame rate: Full, 25, or 30.
Color Support	Select: Mixed, Gray or Color
Reopen per image	Reopen per image
Enable Structured Reporting	Select for Structured Reporting.

DICOM Performed Procedure

DICOM Performed Procedure provides an acknowledgement that a study has been performed.


TCP/IP
Device
Service
Dataflow
Button
Removable Media
Miscellaneous
Add
Remove
Verify
Properties

Destination Device: MyComputer

Dicom Performed Procedure

Dicom Performed Procedure
HD Export
Local Archive - Int HD
Measure/Transfer
Mitsubishi BW Printer(Analog)
Mitsubishi Color Printer(Analog)
Removeable CD Archive

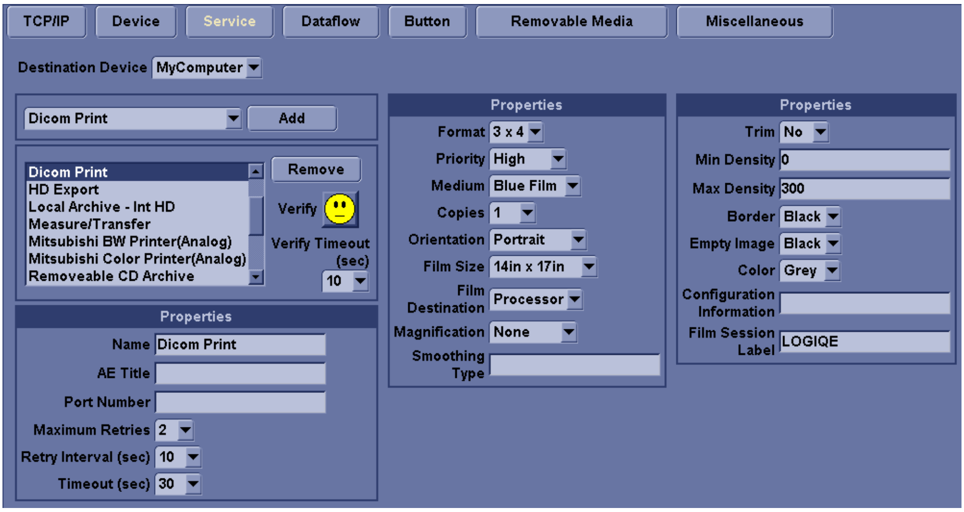
Verify Timeout (sec): 10

Name: Dicom Performed Procec
AE Title:
Port Number:
Maximum Retries: 2
Retry Interval (sec): 10
Timeout (sec): 30

Figure 16-44. DICOM Performed Procedure Service

DICOM Print

DICOM Print provides the ability to send or receive ultrasound image data to DICOM printers.



Destination Device: MyComputer

Dicom Print

Dicom Print
HD Export
Local Archive - Int HD
Measure/Transfer
Mitsubishi BW Printer(Analog)
Mitsubishi Color Printer(Analog)
Removeable CD Archive

Verify Timeout (sec): 10

Name: Dicom Print
AE Title:
Port Number:
Maximum Retries: 2
Retry Interval (sec): 10
Timeout (sec): 30

Format: 3 x 4
Priority: High
Medium: Blue Film
Copies: 1
Orientation: Portrait
Film Size: 14in x 17in
Film Destination: Processor
Magnification: None
Smoothing Type:

Trim: No
Min Density: 0
Max Density: 300
Border: Black
Empty Image: Black
Color: Grey
Configuration Information:
Film Session Label: LOGIQE

Figure 16-45.   DICOM Print Service

Table 16-45:   Properties

Preset Parameter	Description
Format	Indicates how many prints to print per page, for example, 1,1, 1,2, 1,3, up to 7,5. Partial prints are displayed as one print job.
Priority	Specify the print job priority: High, Medium, or Low.
Medium	Select the print medium: Clear Film, Paper, or Blue Film.
Copies	Enter the number of copies.
Orientation	Specify whether to print the image Portrait (vertically) or Landscape (horizontally).
Film Size	Specify the dimensions of the film size.
Film Destination	Specify the film destination for the exposed filmMagazine – Store in a film magazineProcessor – Develop in a film processor
Magnification	Specify how the printer magnifies the image to fit it onto the film.Replicate – Interpolated pixel are copies of the adjacent pixelsBilinear – Interpolated pixels are created by bilinear interpolations between the adjacent pixelsCubic – Interpolated pixels are created by cubic interpolations between the adjacent pixelsNone – No interpolation
Smoothing Type	Specify the printer’s magnification interpolation for the output.
Trim	Specify whether you want a trim box to be printed around each image on the film: Yes or No.

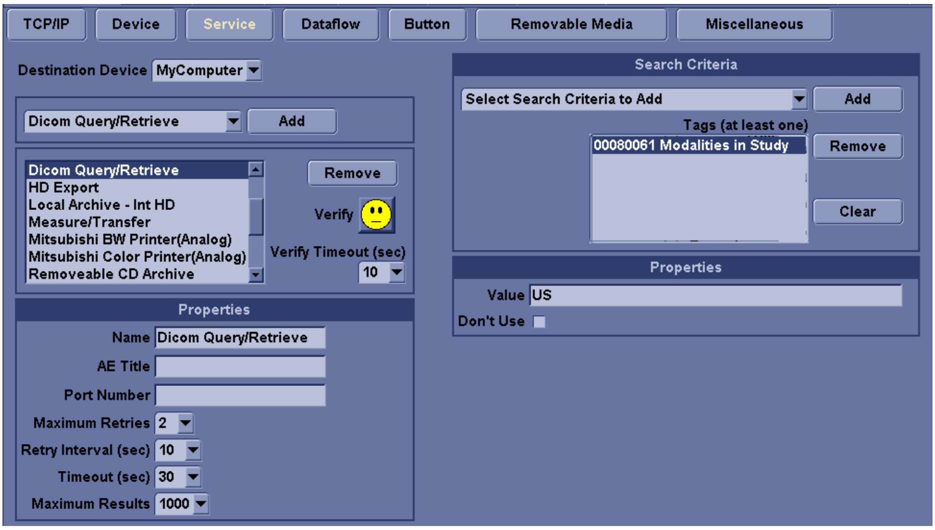
Table 16-45: Properties (Continued)

Preset Parameter	Description
Min Density	Enter a number indicating the minimum density level of the film.
Max Density	Enter a number indicating the maximum density level of the film.
Border	Select to have the border area surrounding and between the images of the film: Black or White.
Empty Image	Select to have a Black or White empty image.
Color	Select whether to have the image Color or Grey.
Configuration Information	Enter vendor-specific image quality settings.
Film Session Label	Type a name for the group of film labels associated with the print job.

DICOM Query/Retrieve

DICOM Query/Retrieve provides a list of patients sorted by query parameters.

NOTE: Some PACS vendors only offer Query/Retrieve as an option. Please confirm that this service is available.


TCP/IP
Device
Service
Dataflow
Button
Removable Media
Miscellaneous
Add
Remove
Verify
Search Criteria
Select Search Criteria to Add
Add
Remove
Clear
Properties
Properties

Destination Device: MyComputer

Dicom Query/Retrieve

- Dicom Query/Retrieve
- HD Export
- Local Archive - Int HD
- Measure/Transfer
- Mitsubishi BW Printer(Analog)
- Mitsubishi Color Printer(Analog)
- Removeable CD Archive

Verify Timeout (sec): 10

Name: Dicom Query/Retrieve
AE Title:
Port Number:
Maximum Retries: 2
Retry Interval (sec): 10
Timeout (sec): 30
Maximum Results: 1000

Tags (at least one): 00080061 Modalities in Study

Value: US
Don't Use ☐

Figure 16-46. DICOM Query/Retrieve Service

Table 16-46: DICOM Query/Retrieve

Preset Parameter	Description
Max. Result	Specify the maximum number of patient records you want the system to retrieve when searching the patient database.
Search Criteria	Displays the Search Criteria window, where you can enter search parameters for the system to use when searching the patient database.

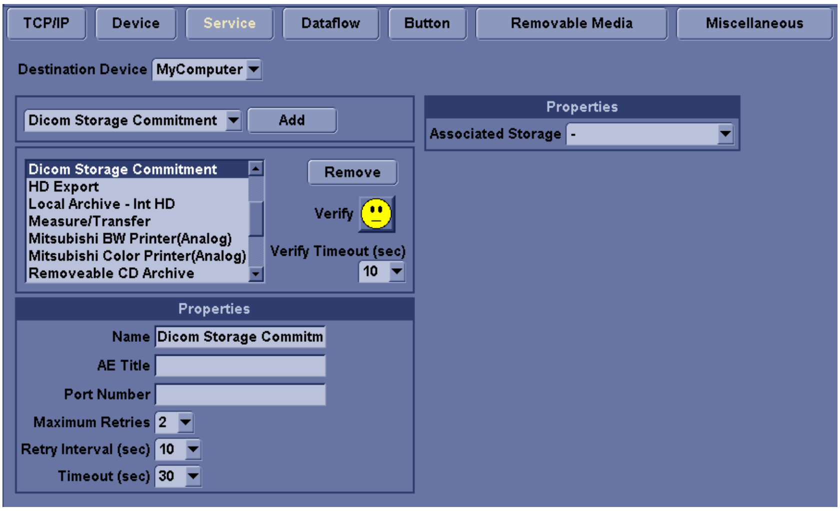
DICOM Query/Retrieve (continued)

Table 16-47: DICOM Query/Retrieve Search Criteria

Preset Parameter	Description
Select Search Criteria to Add	Select the type of information that you want to define for search parameters. The following searches are allowed: Patient Name, Patient ID, Modality, Scheduled Procedure Start Date, Start Time, and End Time.
Tags (at least one)	The name of a tag selected to use for search criteria.
Properties: Value	Type the value of the Selected Tag item. For example, if you select Referring Physician’s Name in the Select Tag field, you can enter the name of the physician in the Value field.
Properties: Don’t Use	Select to turn off the selected search criteria. To exclude a tag from the worklist query, select Don’t Use and then select Add to List.
Add	Select to add the tag and value to the list of search criteria.
Remove	Select to remove the tag and value from the list of search criteria.
Clear	Clears all tags.

DICOM Storage Commitment

DICOM Storage Commitment provides acknowledgement from PACS that the study has been accepted into archive.


TCP/IP
Device
Service
Dataflow
Button
Removable Media
Miscellaneous
Add
Remove
Verify
Properties
Properties

Destination Device: MyComputer

Dicom Storage Commitment

Dicom Storage Commitment
HD Export
Local Archive - Int HD
Measure/Transfer
Mitsubishi BW Printer(Analog)
Mitsubishi Color Printer(Analog)
Removeable CD Archive

Verify Timeout (sec): 10

Name: Dicom Storage Commitm
AE Title:
Port Number:
Maximum Retries: 2
Retry Interval (sec): 10
Timeout (sec): 30

Associated Storage: -

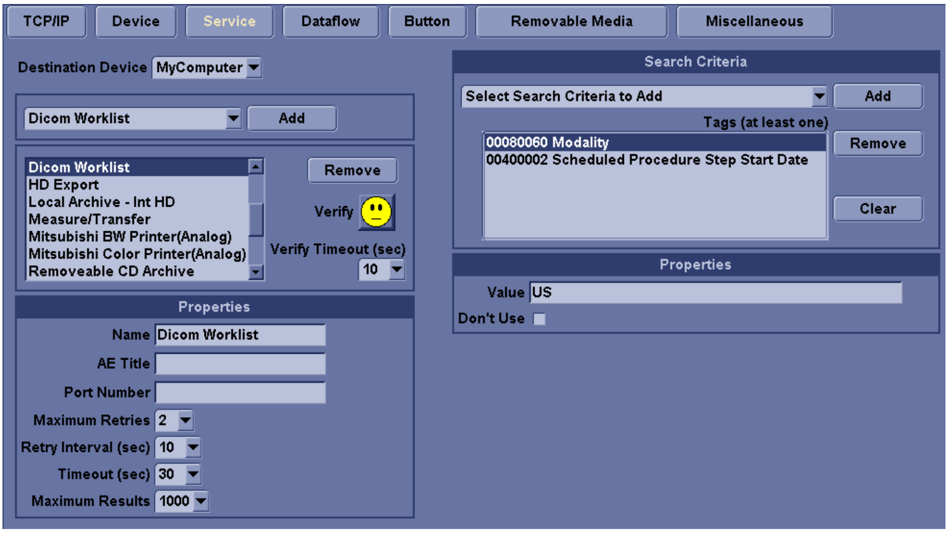
Figure 16-47. DICOM Storage Commitment Service

Table 16-48: DICOM Storage Commitment

Preset Parameter	Description
Associated Storage	This selection is based on the services entered by the user.

DICOM Worklist

DICOM Worklist provides a list of patients sorted by query parameters.


TCP/IP
Device
Service
Dataflow
Button
Removable Media
Miscellaneous
Add
Remove
Verify
Search Criteria
Add
Remove
Clear
Properties
Properties

Destination Device: MyComputer

Dicom Worklist

Dicom Worklist
HD Export
Local Archive - Int HD
Measure/Transfer
Mitsubishi BW Printer(Analog)
Mitsubishi Color Printer(Analog)
Removeable CD Archive

Verify Timeout (sec): 10

Name: Dicom Worklist
AE Title:
Port Number:
Maximum Retries: 2
Retry Interval (sec): 10
Timeout (sec): 30
Maximum Results: 1000

Select Search Criteria to Add

Tags (at least one)
00080060 Modality
00400002 Scheduled Procedure Step Start Date

Value: US
Don't Use ☐

Figure 16-48. DICOM Worklist Service

Table 16-49: DICOM Worklist

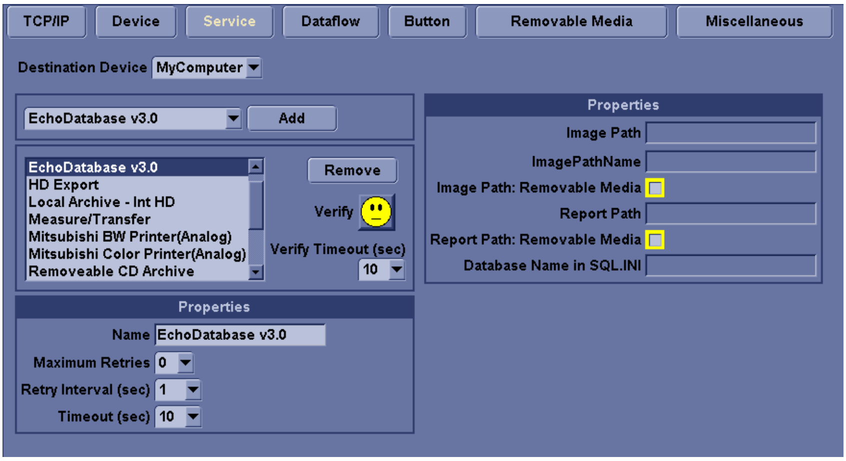
Preset Parameter	Description
Max. Result	Specify the maximum number of patient records you want the system to retrieve when searching the patient database.
Search Criteria	Displays the Search Criteria window, where you can enter search parameters for the system to use when searching the patient database.

DICOM Worklist (continued)

Table 16-50: DICOM Worklist Search Criteria

Preset Parameter	Description
Select Search Criteria to Add	Select the type of information that you want to define for search parameters. The following searches are allowed: Patient Name, Patient ID, Modality, Scheduled Procedure Start Date, Start Time, and End Time.
Tags (at least one)	The name of a tag selected to use for search criteria.
Properties: Value	Type the value of the Selected Tag item. For example, if you select Referring Physician’s Name in the Select Tag field, you can enter the name of the physician in the Value field.
Properties: Don’t Use	Select to turn off the selected search criteria. To exclude a tag from the worklist query, select Don’t Use and then select Add to List.
Add	Select to add the tag and value to the list of search criteria.
Remove	Select to remove the tag and value from the list of search criteria.
Clear	Clears all tags.

Echo Database V3.0


TCP/IP
Device
Service
Dataflow
Button
Removable Media
Miscellaneous
Add
Remove
Verify
Properties
Image Path
ImagePathName
Image Path: Removable Media ☐
Report Path
Report Path: Removable Media ☐
Database Name in SQL.INI
Properties

Destination Device: MyComputer

EchoDatabase v3.0

EchoDatabase v3.0
HD Export
Local Archive - Int HD
Measure/Transfer
Mitsubishi BW Printer(Analog)
Mitsubishi Color Printer(Analog)
Removeable CD Archive

Verify Timeout (sec): 10

Name: EchoDatabase v3.0
Maximum Retries: 0
Retry Interval (sec): 1
Timeout (sec): 10

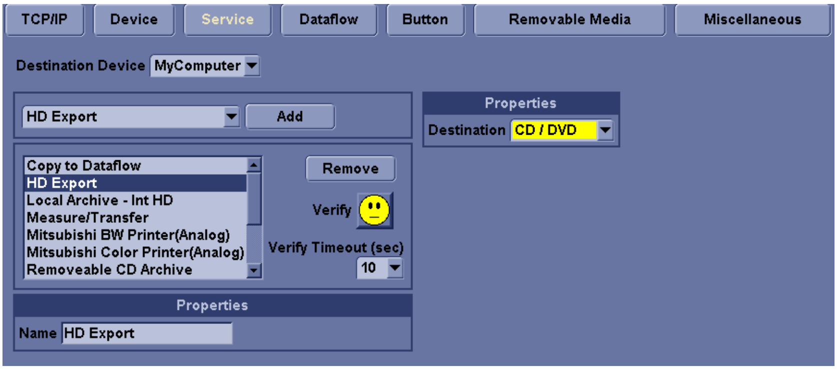
Figure 16-49. Echo Database V3.0 Service

Table 16-51: EchoDatabase ODBC

Preset Parameter	Description
Image Path	Enter the path to the image archive. If the image archive is on a removable disk, select Removable Media.
Image Path Name	Type the path's name.
Report Path	Enter the path to the report archive. If the report archive is on a removable disk, select Removable Media.
Image Path/Report Path: Removable Media	Select media.
Database Name in SQL.INI	The name of the database.

HD Export

You can save individual Cine clips (moving images - avi format) or still images (jpg format) directly to a CD/DVD or Hard Disk by pressing a print key.


TCP/IP
Device
Service
Dataflow
Button
Removable Media
Miscellaneous
Add
Remove
Verify
Copy to Dataflow
HD Export
Local Archive - Int HD
Measure/Transfer
Mitsubishi BW Printer(Analog)
Mitsubishi Color Printer(Analog)
Removeable CD Archive
Properties

Destination Device MyComputer

HD Export

Destination CD / DVD

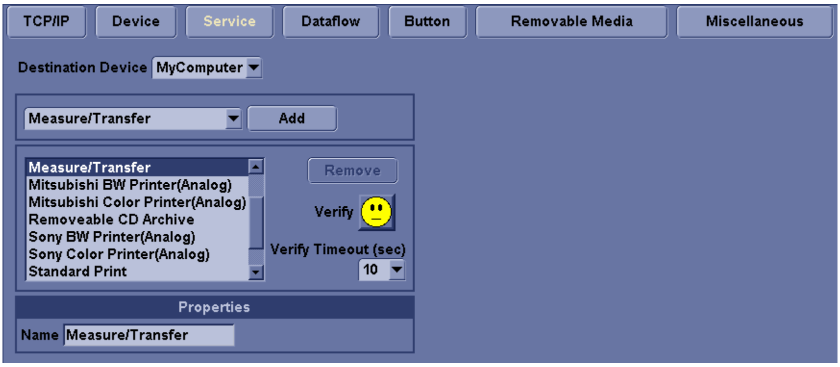
Verify Timeout (sec) 10

Name HD Export

Figure 16-50. HD Export Service

Measure/Transfer

You can use the Measure/Transfer service for sending exam information to another PC where data management information gets downloaded to.


TCP/IP
Device
Service
Dataflow
Button
Removable Media
Miscellaneous
Add
Remove
Verify
Properties

Destination Device MyComputer

Measure/Transfer

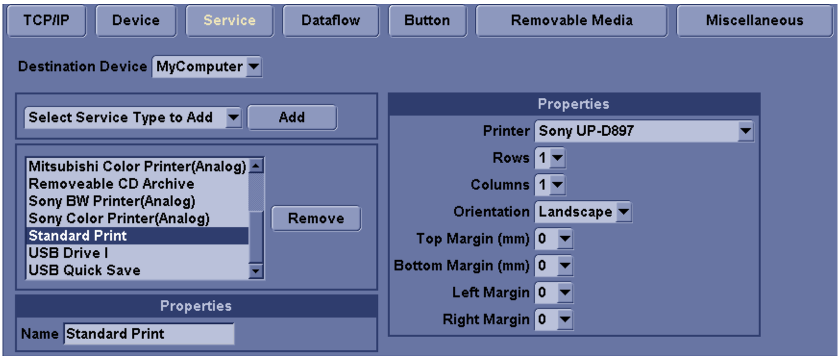
Measure/Transfer
Mitsubishi BW Printer(Analog)
Mitsubishi Color Printer(Analog)
Removeable CD Archive
Sony BW Printer(Analog)
Sony Color Printer(Analog)
Standard Print

Verify Timeout (sec) 10

Name Measure/Transfer

Figure 16-51. Measure/Transfer Service

Standard Print


TCP/IP
Device
Service
Dataflow
Button
Removable Media
Miscellaneous
Select Service Type to Add
Add
Remove
Properties
Properties

Destination Device MyComputer

Mitsubishi Color Printer(Analog)
Removeable CD Archive
Sony BW Printer(Analog)
Sony Color Printer(Analog)
Standard Print
USB Drive I
USB Quick Save

Name Standard Print

Printer Sony UP-D897
Rows 1
Columns 1
Orientation Landscape
Top Margin (mm) 0
Bottom Margin (mm) 0
Left Margin 0
Right Margin 0

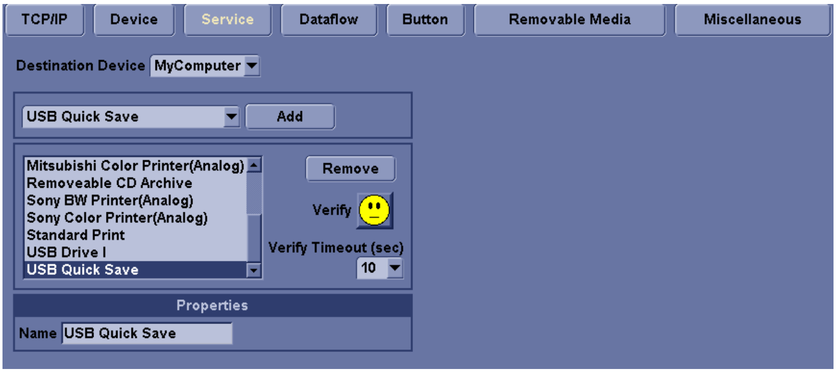
Figure 16-52. Standard Print Service

Table 16-52: Standard Print

Preset Parameter	Description
Printer	Select the printer.
Rows	Specify 1-5.
Columns	Specify 1-5.
Orientation	Specify Landscape/Portrait
Top Margin (mm)	Specify the top margin (0-51mm)
Bottom Margin (mm)	Specify the bottom margin (0-51mm)
Left Margin	Specify the left margin (0-51mm)
Right Margin	Specify the right margin (0-51mm)

USB Quick Save

You can save individual Cine clips (moving images - avi format) or still images (jpg format) directly to a USB memory disk by pressing a print key.


TCP/IP
Device
Service
Dataflow
Button
Removable Media
Miscellaneous
Add
Mitsubishi Color Printer(Analog)
Removeable CD Archive
Sony BW Printer(Analog)
Sony Color Printer(Analog)
Standard Print
USB Drive I
USB Quick Save
Remove
Verify
Properties

Destination Device MyComputer

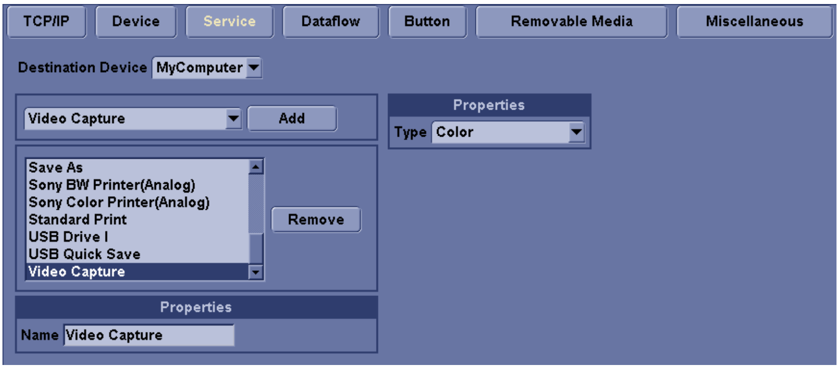
USB Quick Save

Verify Timeout (sec) 10

Name USB Quick Save

Figure 16-53. USB Quick Save Service

Video Capture


TCP/IP
Device
Service
Dataflow
Button
Removable Media
Miscellaneous
Video Capture
Add
Save As
Sony BW Printer(Analog)
Sony Color Printer(Analog)
Standard Print
USB Drive I
USB Quick Save
Video Capture
Remove
Properties
Properties

Destination Device MyComputer

Type Color

Name Video Capture

Figure 16-54. Video Capture Service

Table 16-53: Standard Print

Preset Parameter	Description
Color	Specify Color, BW, Ext1 or Ext2.

Setting up a Printer

There are two service types that pertain to printers: Standard Print and Video Capture Device.

Standard Print. Use Standard Print for digital peripherals. These are printers with either a USB interface or Ethernet interface (Sony UP-D23MD, for example).

Video Capture Device. Use Video Capture Device for devices that are triggered by a contact closure, typically analog devices (color printer, black/white printer, EXT1 and EXT2, for example).

On the Utility --> Connectivity --> Button page, select the Print key in the upper, left-hand corner of the display. In the middle portion of the page, under Available Input/Outputs, select the printer you want to configure. Next, press the two right arrows (>>) in the upper, right-hand corner of the page to move this printer into the Printflow View.

You can also configure the Standard Print button that appears on the New Patient Active Images screen.

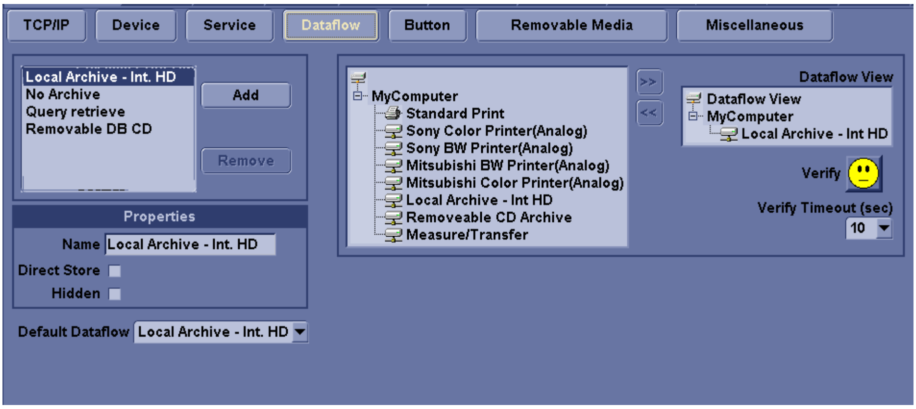
Example: For instance a video capture device, on the Utility --> Connectivity --> Service page, in the Service Type to Add box, and press Add. In the properties box on the upper, right-hand side, select the type of device and in the Properties box in the lower, left-hand side, type in a unique descriptive name for this device.

Dataflow

A dataflow is a set of pre-configured services. When you select a dataflow, the ultrasound system automatically works according to the services associated with the dataflow. The Dataflow tab allows you to select and review information about dataflows. You can also create, change, and remove dataflows.

Set up dataflows for the services. Workflow MUST be PRIMARY in a dataflow. Also, Query/Retrieve MUST be the only service in a dataflow -- also, set it to Hidden so that it cannot be selected from the Patient menu.

NOTE: You must be logged on as Administrator to use the Dataflow tab.


TCP/IP
Device
Service
Dataflow
Button
Removable Media
Miscellaneous
Local Archive - Int. HD
No Archive
Query retrieve
Removable DB CD
Add
Remove
Properties
MyComputer
Standard Print
Sony Color Printer(Analog)
Sony BW Printer(Analog)
Mitsubishi BW Printer(Analog)
Mitsubishi Color Printer(Analog)
Local Archive - Int HD
Removeable CD Archive
Measure/Transfer
>>
<<
Dataflow View
Dataflow View
MyComputer
Local Archive - Int HD
Verify
Verify Timeout (sec)

Name Local Archive - Int. HD

Direct Store ☐

Hidden ☐

Default Dataflow Local Archive - Int. HD

Verify Timeout (sec) 10

Figure 16-55. Dataflow Preset Menu

Table 16-54: Dataflow

Preset Parameter	Description
Name	Select the dataflow from the list.
Direct Store	Select to store data directly to archive (no buffer storage).
Hidden	Select so that this dataflow does not appear as a Dataflow on the Patient menu.
Default Dataflow	Select to use this dataflow as the default dataflow when you start the system.

Button

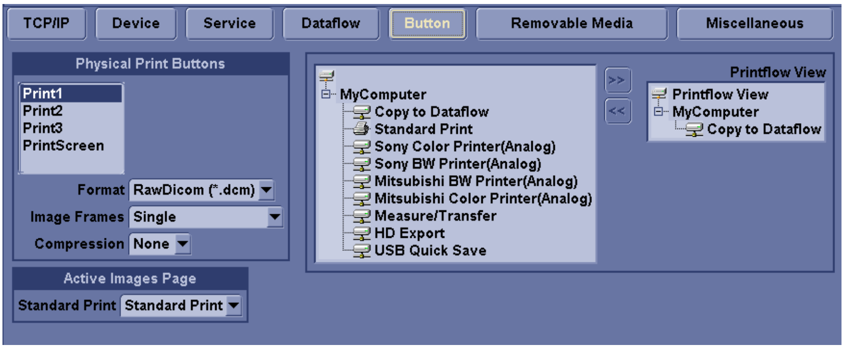
You can assign print buttons via the Utility --> Connectivity --> Button page.

Assigning print buttons. First select the print button to configure on the upper, left corner of the page. Then select the device you want to add in the middle part of the page, under Available Input/ Outputs. Then click on the right arrow in the top right corner of the page.

NOTE: You can configure each print key to multiple output devices/ dataflows.

NOTE: Only attach one DICOM service per print key (e.g., PACS and DICOM printer). Multiple DICOM devices should be configured via a dataflow.

NOTE: When using a print key to send an image directly to a DICOM device, this causes a single DICOM association per image. Most devices (all known printers) work fine with this. However, some storage devices, such as ALI, Kodak Access, and Cemax, assume that the end of each association is the end of the exam and can result in a new folder for each image. In the Utility menu, select a single association or open PR for the desired DICOM storage device.


TCP/IP
Device
Service
Dataflow
Button
Removable Media
Miscellaneous
Physical Print Buttons
Print1
Print2
Print3
PrintScreen
Active Images Page
MyComputer
Copy to Dataflow
Standard Print
Sony Color Printer(Analog)
Sony BW Printer(Analog)
Mitsubishi BW Printer(Analog)
Mitsubishi Color Printer(Analog)
Measure/Transfer
HD Export
USB Quick Save
>>
<<
Printflow View
Printflow View
MyComputer
Copy to Dataflow

Format RawDicom (*.dcm)
Image Frames Single
Compression None
Standard Print Standard Print

Figure 16-56. Button Preset Menu

Table 16-55: Button

Preset Parameter	Description
Format	RawDICOM, DICOM, or M&A.
Image Frames	Single (captures a DICOM single frame image), Multiple (captures a DICOM multiframe, CINE) -- only select this if the PACS supports multiframe, and Secondary Capture (forces all DICOM images to Secondary Capture).
Compression	Always set to None.

Table 16-55: Button (Continued)

Preset Parameter	Description
Active Images Page	Lets you send to a Windows-based printer.
Single Association	Only visible with DICOM image storage destinations. When selected, the spooler sends multiple images in one store job.

Removable Media

The Removable Media tab allows you to:

- Verify the DICOM directory on removable media.
- Verify the free space of the media.
- Verify that the media is finalized or unfinalized.
- Verify that the media is formatted or unformatted.
- Format removable media (rewritable CD/DVD or USB device).

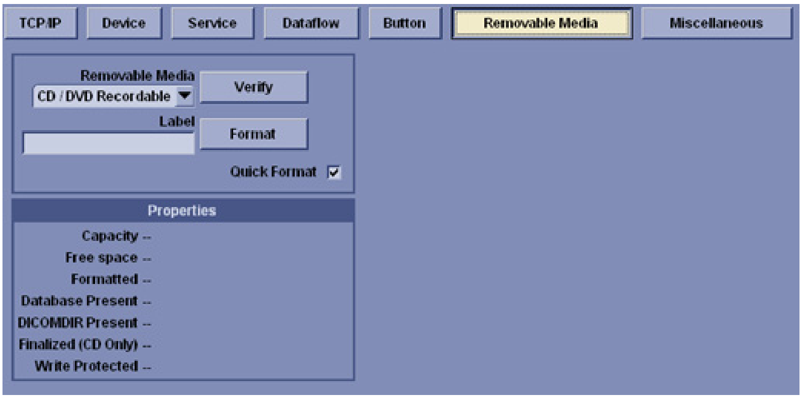

TCP/IP
Device
Service
Dataflow
Button
Removable Media
Miscellaneous
Removable Media
CD / DVD Recordable
Verify
Label
Format
Quick Format ☑
Properties
Capacity --
Free space --
Formatted --
Database Present --
DICOMDIR Present --
Finalized (CD Only) --
Write Protected --

Figure 16-57. Removable Media Preset Menu

Removable Media (continued)

Table 16-56: Tools

Preset Parameter	Description
Verify	• Select to verify DICOM directory on removable DICOM disk. • Verify the free space of the media. • Verify that the media is finalized or unfinalized. • Verify that the media is formatted or unformatted.
Format	Select to format removable media.
Media	Select the removable media to format or verify.
Label	Type a label for a new removable media (free text).

The bottom of the screen lists properties of the selected media.

Formatting removable media

1. Select the removable media from the Media list.
2. Type a name for the removable media in the Label field.

NOTE: Do not use the following characters for labelling:

\ / : ; . , * < > | + = [ ]

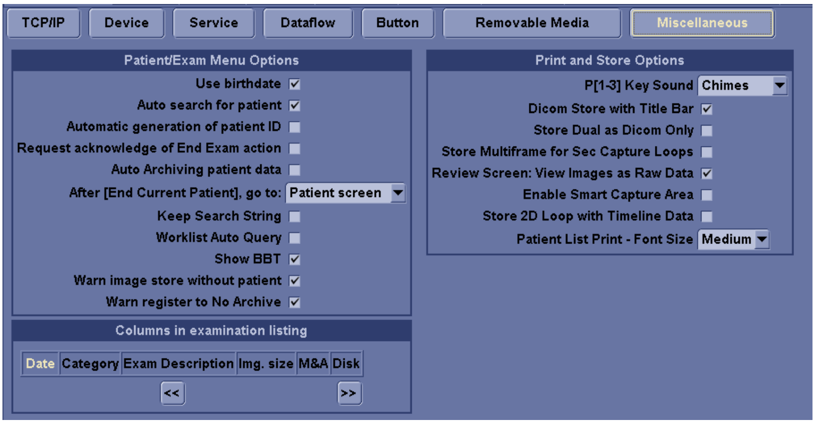
3. Select Format. Confirm **OK** or **Cancel**.
4. An information window confirms when the format has been completed. Select **OK** to exit.

Verifying removable media

1. Select the removable media from the Media list.
2. Select Verify.

Miscellaneous

The Miscellaneous tab allows you to configure tools related to patient management and print and store options. You can specify default system functionality, such as whether patient ID is required when you archive data, or if you want the system to automatically search the archive for a patient when you enter patient data.



Patient/Exam Menu Options

Use birthdate ☑
Auto search for patient ☑
Automatic generation of patient ID ☐
Request acknowledge of End Exam action ☐
Auto Archiving patient data ☐
After [End Current Patient], go to: Patient screen
Keep Search String ☐
Worklist Auto Query ☐
Show BBT ☑
Warn image store without patient ☑
Warn register to No Archive ☑

Columns in examination listing

Date	Category	Exam Description	Img. size	M&A	Disk

Print and Store Options

P[1-3] Key Sound Chimes
Dicom Store with Title Bar ☑
Store Dual as Dicom Only ☐
Store Multiframe for Sec Capture Loops ☐
Review Screen: View Images as Raw Data ☑
Enable Smart Capture Area ☐
Store 2D Loop with Timeline Data ☐
Patient List Print - Font Size Medium

Figure 16-58. Miscellaneous Preset Menu

Table 16-57: Patient/Exam Menu Options

Preset Parameter	Description
Use birthdate	In the Patient information window, enter either the patient age or the birth date:When selected, enter birth date, then the age is calculated.When cleared, enter age (birth date field not available).
Auto search for patient	In the Search/Create Patient window:When selected, the system automatically searches through the selected patient archive, while the user enters patient information.When cleared, the automatic search tool is turned off. If you are trying to keep the past patient data confidential, DO NOT use this feature.
Automatic generation of patient ID	In the Search/Create Patient window:When selected, the Patient ID is not required when entering a new patient in the archive. The system automatically generates an ID number.When cleared, the Patient ID is required when entering a new patient in the archive.
Request acknowledge of End Exam action	When selected, the user is asked to confirm action when ending an examination.
Auto Archiving Patient Data	Check box to select.
After [End Current Exam], go to:	Select Worklist screen or Patient screen.
Keep Search String	Select so that search tool ‘remembers’ last search string.

Table 16-57: Patient/Exam Menu Options (Continued)

Preset Parameter	Description
Worklist Auto Query	Check box to select.
Worklist Auto Query Verify Timeout (sec)	Select time interval.
Show BBT	Select to input basal body temperature on the OB Patient screen.

Examination list window column configuration

You can create new columns, remove columns, and select the information to display in a column.

1. Move the **Trackball** to highlight a column.
2. Press **Set.**
3. Use the arrows (<< or >>) to reposition column headings.

Print and Store Options

Table 16-58: Print and Store Options

Preset Parameter	Description
P[1-3] Key Sound	Select None, Click, Chimes, Ding, Ding-Dong, or Whoosh.
Dicom Store with Title Bar	Check box to select.
Store Dual as Dicom Only	Select to always store dual images as a DICOM (secondary capture) store, rather than Raw DICOM.
Store Multiframe for Sec Capture Loops	If this box is selected: • Press the appropriate print key after freezing the image, the image stores as a secondary capture (still image). • Press the appropriate print key without freezing the image, the image automatically stores as a multiframe. If this box is not selected: • A multiframe stores as a secondary capture (still image). NOTE: This is available if you select Secondary capture for Image Frames on the Utility -> Connectivity -> Button page.
Review Screen: View Images as Raw Data	Select to display the review image as raw data.
Enable Smart Capture Area	Check box to select.
Store 2D Loop with Timeline Data	Check box to select.
Patient List Print	Select font size.

Measure

Please refer to Chapter 7, General Measurements and Calculations for more information on setting up Measurement and Analysis Presets.

System Administration

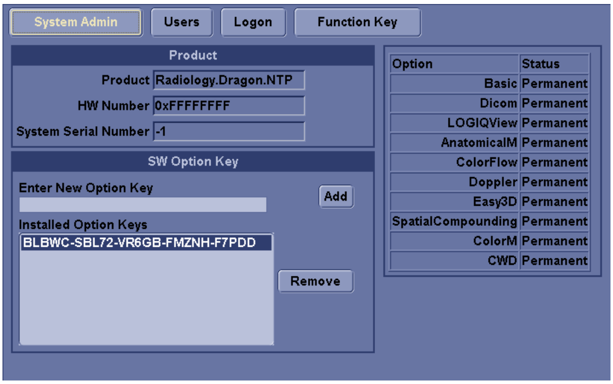
Overview

The Admin screen has the following three sections:

- **System Administration** – lists all the options implemented in the system.
- **Users** – allows you to define user IDs, specify operator's registration, operator's rights, and registration of staff related to an examination (for example, referral doctors and sonographers).
- **Logon** – defines logon procedures.
- **Function Keys** – allows you to program function keys to your preferences.

System Admin

The System Admin screen has information about any options implemented for the system.



Product Radiology.Dragon.NTP

HW Number 0xFFFFFFFF

System Serial Number -1

Installed Option Keys: BLBWC-SBL72-VR6GB-FMZNH-F7PDD

Option	Status
Basic	Permanent
Dicom	Permanent
LOGIQView	Permanent
AnatomicalM	Permanent
ColorFlow	Permanent
Doppler	Permanent
Easy3D	Permanent
SpatialCompounding	Permanent
ColorM	Permanent
CWD	Permanent

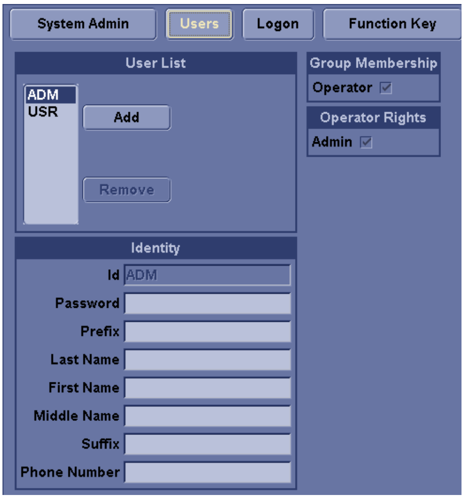
Figure 16-59. Administrative System Admin Preset Menu

Table 16-59: System Administration

Preset Parameter	Description
Product	The name of the product.
HW Number	The hardware number of the product.
System Serial Number	The system serial number of the product.
SW Option Key	The software option key section.
Enter New Option Key	Type the key for the option you wish to add and press Add.
Installed Option Keys	Lists the key for the installed options.
Remove	To remove a software option key, select the key in the SW Option Key list, and then select Remove.
Options	A list of the option name and status.
Status	Lists each option's effectivity.

Users

The Users screen allows you to define user IDs. It also allows you to specify operators registration, operator's rights setting, and registration of staff related to an examination (for example, referring and interpreting physicians).


System Admin
Users
Logon
Function Key
User List
ADM
USR
Add
Remove
Group Membership
Operator Rights
Identity
Password
Prefix
Last Name
First Name
Middle Name
Suffix
Phone Number

Id ADM

Operator ☑

Admin ☑

Figure 16-60. Users Preset Menu

Table 16-60: User List

Preset Parameter	Description
User List	Lists the user ID for all system users.
Identity	Type the operator's user ID, Password, Prefix, Last Name, First Name, Middle Name, Suffix, Phone Number.
Group Membership	Select the user's group:Operator (sonographers, doctors, or any person using the ultrasound system)
Operator Rights	Admin – If selected, the operator has extended rights with access to the administrative setup functionality. The operator can also perform advanced operations

Creating a user

1. Press New.
2. Type the user ID. ENSURE that you DO NOT include the following characters in a user's ID: slash (/), dash (-), asterisk (*), question mark (?), an underscore (_), or blank spaces. Also, DO NOT set up a user with the same intitials/ signifier.
3. Type the user's information in the Identity section.
4. Select the user's group(s).
5. If the user needs full configuration and advanced operations access, select Admin.
6. Press Save.

NOTE: *DO NOT add users with the same initials/signifier. The system allows you to do this; however, the first user is erased and only the second remains.*

NOTE: *When adding a new user, press Add first. Then edit the ID from the default of "NewUser" and edit the other fields. DO NOT press Add again unless you actually want to create another user. Press Save after adding one or more users. The user listed as NewUser on the list will be updated with the edited ID when you re-enter this screen.*

NOTE: *You need to first set up a user here prior to setting up a user for VoiceScan.*

Changing a user configuration

1. Move the **Trackball** to a user ID in the User List.
2. Make the desired changes.

Deleting a user

1. Move the **Trackball** to a user ID in the User List.
2. Select Remove.

   The user is removed from the User List.

Logon

The Logon section defines log on procedures.

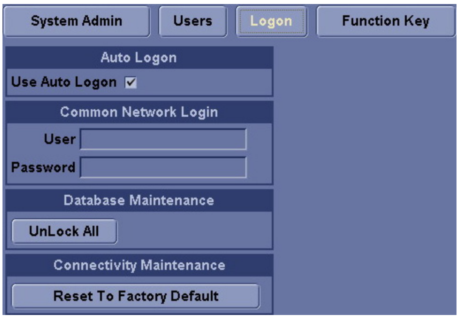

System Admin
Users
Logon
Function Key
Auto Logon
Use Auto Logon ☑
Common Network Login
User
Password
Database Maintenance
UnLock All
Connectivity Maintenance
Reset To Factory Default

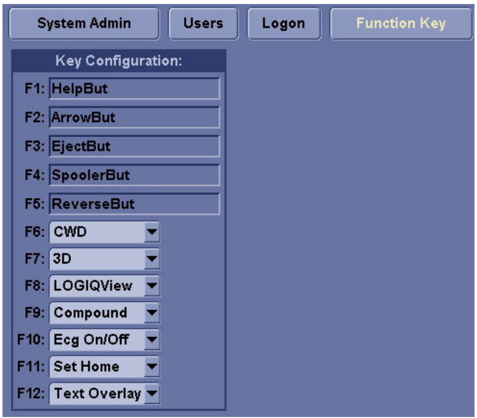
Figure 16-61. Administrative Logon Preset Menu

Table 16-61: Logon

Preset Parameter	Description
Auto Logon	Specifies logon procedures: • When blank, the user must select a user ID and enter a password when logging on. • When selected, the system is started automatically, using the last user logon.
Common Network Login	Specifies the user ID and password used to access the network.User – User ID for network accessPassword – Password for network access
Database Maintenance	Select to release all patients.

Function Keys

The function key section defines the programmable functions allowable for the function keys.



F1: HelpBut
F2: ArrowBut
F3: EjectBut
F4: SpoolerBut
F5: ReverseBut
F6: CWD
F7: 3D
F8: LOGIQView
F9: Compound
F10: Ecg On/Off
F11: Set Home
F12: Text Overlay

Figure 16-62. Administrative Function Key Preset Menu

Table 16-62: Function Keys

Preset Parameter	Description
Function Keys	Programmable functions for the F8 through F12 keys. • ECG On/Off • Set Home • Text Overlay • Grab Last • Word Delete • Compound • LOGIQ View • 3D • CWD

Service

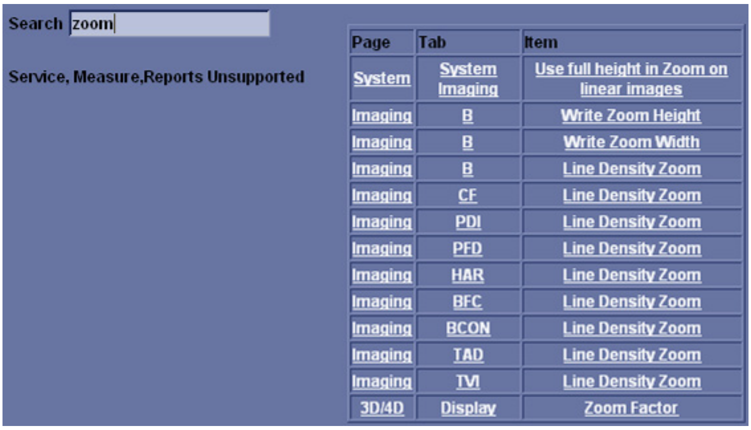
Press Service to activate the Service browser interface.

Search

Opens up a search window to find a parameter on the utility pages.

To search for a utility parameter,

1. Press Search.
2. Type in the search string. For instance, if you're searching for *Turn on Zone Matching Filter*, you could just type 'zone'.



Search zoom

Service, Measure,Reports Unsupported

Page	Tab	Item
System	System Imaging	Use full height in Zoom on linear images
Imaging	B	Write Zoom Height
Imaging	B	Write Zoom Width
Imaging	B	Line Density Zoom
Imaging	CF	Line Density Zoom
Imaging	PDI	Line Density Zoom
Imaging	PFD	Line Density Zoom
Imaging	HAR	Line Density Zoom
Imaging	BFC	Line Density Zoom
Imaging	BCON	Line Density Zoom
Imaging	TAD	Line Density Zoom
Imaging	TVI	Line Density Zoom
3D/4D	Display	Zoom Factor

Figure 16-63. Search Example

3. A list of possible matches appears to the right. Select the correct match.

NOTE: You cannot perform a search on the Measure or Service utility pages.

Chapter 17

Probes and Biopsy

This chapter consists of the information of each probe and describes some special concerns, biopsy kits and accessories as well as basic procedures for attaching a bispsy guide to the different types of probes.

Probe Overview

Ergonomics

Probes have been ergonomically designed to:

- Handle and manipulate with ease
- Connect to the system with one hand
- Be lightweight and balanced
- Have rounded edges and smooth surfaces.
- Stand up to typical wear by cleaning and disinfectant agents, contact with approved gel, etc.

Cables have been designed to:

- Connect to system with appropriate cable length

Cable handling

Take the following precautions with probe cables:

- Keep free from wheels
- Do not bend the cable acutely
- Avoid crossing cables between probes.

Probe orientation

Each probe is provided with an orientation marking (refer to Figure 17-1). This mark is used to identify the end of the probe corresponding to the side of the image having the orientation mark on the display.

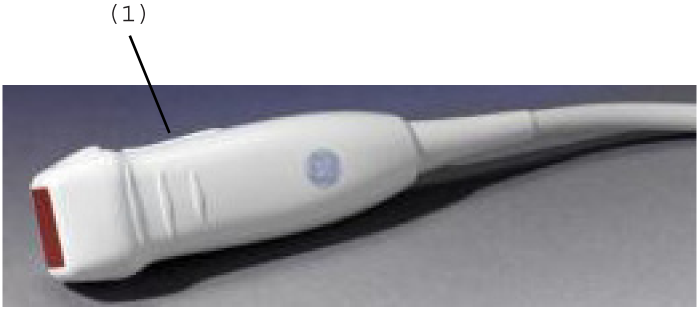


Figure 17-1. Orientation Marking on Probe (Example)

1. Orientation Mark

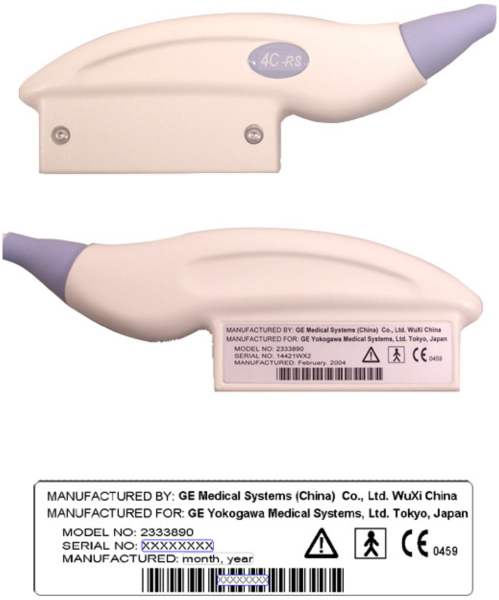
Labeling

Each probe is labeled with the following information:

- Seller's name and manufacturer
- Operating frequency (not shown on all probes)
- GE part number
- Probe serial number
- Month and year of manufacture
- Probe designation-provided on the probe grip and the top of the connector housing, so it is easily read when mounted on the system and is also automatically displayed on the screen when the probe is selected.

NOTE: *Below is a representative sample of how a probe is labeled; however, not all probes are labeled in this manner.*

Labeling (continued)



MANUFACTURED BY: **GE Medical Systems (China) Co., Ltd. WuXi China**
MANUFACTURED FOR: **GE Yokogawa Medical Systems, Ltd. Tokyo, Japan**
MODEL NO: 2333890
SERIAL NO: XXXXXXXX
MANUFACTURED: month, year
CE 0459

Figure 17-2. Probe Adapter Label

Labeling (continued)

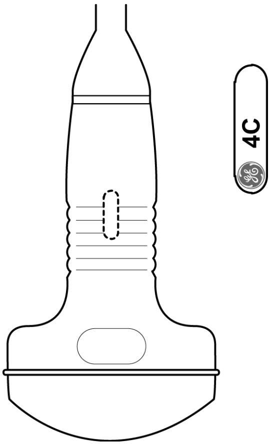
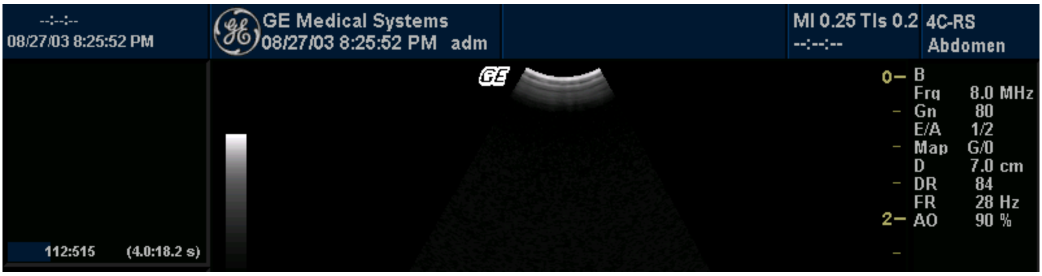


Figure 17-3. Probe Handle Labels



--:--:--
08/27/03 8:25:52 PM

GE Medical Systems
08/27/03 8:25:52 PM adm

MI 0.25 TIs 0.2
--:--:--

4C-RS
Abdomen

B
Frq 8.0 MHz
Gn 80
E/A 1/2
Map G/0
D 7.0 cm
DR 84
FR 28 Hz
AO 90 %

112:515 (4.0:18.2 s)

Figure 17-4. Displayed Probe Information

LOGIQ e Applications

Table 17-1: Probe Indications for Use

Probe Application	4C-RS	E8C-RS	8L-RS	8C-RS	i12L-RS	3S-RS	12L-RS
Abdomen	X			O		O	
Small Parts			X		O		X
Obstetrics	X	X				O	
Gynecology	X	X				O	
Pediatrics	X		O	X	O	O	O
Neonatal			O	X	O		O
Urology	X	O				O	
Cardiac						X	
Endocavitary		X					
Transcranial						X	
Intraoperative			O	O	X		O
Vascular	O		X	O	X	O	X
Biopsy	O	O	O			O	O

X Main Application 0 Accessory Application

LOGIQ e Features

Table 17-2: Probe Features

Probe Application	4C-RS	E8C-RS	8L-RS	8C-RS	i12L-RS	3S-RS	12L-RS
LOGIQ View	X	X	X	X	X	X	X
Virtual Convex			X		X		X
Easy 3D	X	X	X	X	X	X	X
M Color Flow	X	X	X	X	X	X	X
Tru Access	X	X	X	X	X	X	X
Non-Imaging CW						X	
Compounding			X				X
ACO	X	X	X	X	X	X	X

Specifications

Table 17-3: System Probe Definitions

Probe Designation	Center Image Frequency [MHz)	Doppler Frequency (MHz)	
		Normal	Penetration
4C-RS	3.2 ± 10%	3.3	2.5
E8C-RS	6.5 ± 20%	5.0	4.0
8L-RS	6.2 ± 20%	4.4	4.0
8C-RS	6.5 ± 20%	5.0	4.0
i12L-RS	5.8 ± 10%	4.4	4.0
3S-RS	2.0 ± 20%	2.2	1.8
12L-RS	7.5 ± 20%	4.4	4.0

Probe Usage

For details on connecting, activating, deactivating, disconnecting, transporting and storing the probes, See ‘Probes’ on *page 3-32 for more information.*

Care and Maintenance

Inspecting probes

Perform After Each Use Inspect the probe's lens, cable, casing, and connector. Look for any damage that would allow liquid to enter the probe. If any damage is found, do not use the probe until it has been inspected and repaired/replaced by a GE Service Representative.

NOTE: *Keep a log of all probe maintenance, along with a picture of any probe malfunction.*

Environmental Requirements

Probes should be operated, stored, or transported within the parameters outlined below.

CAUTION Ensure that the probe face temperature does not exceed the normal operation temperature range.

Table 17-4: Probe Environmental Requirements

	Operational	Storage	Transport
Temperature	10° - 40° C 50° - 104° F	-5° - 50° C 14° - 140° F	-5° - 50° C -40° - 140° F
Humidity	30 - 75 % non-condensing	10 - 90% non-condensing	10 - 90% non-condensing
Pressure	700 - 1060hPa	700 - 1060hPa	700 - 1060hPa

Probe Safety

Handling precautions

WARNING

Ultrasound probes are highly sensitive medical instruments that can easily be damaged by improper handling. Use care when handling and protect from damage when not in use. DO NOT use a damaged or defective probe. Failure to follow these precautions can result in serious injury and equipment damage.

Electrical shock hazard

Electrical Hazard

The probe is driven with electrical energy that can injure the patient or user if live internal parts are contacted by conductive solution:

- **DO NOT** immerse the probe into any liquid beyond the level indicated by the immersion level diagram. Refer to the immersion illustration in the Probe Cleaning Process section. Never immerse the probe connector or probe adaptors into any liquid.
- **DO NOT** drop the probes or subject them to other types of mechanical shock or impact. Degraded performance or damage such as cracks or chips in the housing may result.
- Prior to each use, visually inspect the probe lens and case area for cracks, cuts, tears, and other signs of physical damage. DO NOT use a probe which appears to be damaged until you verfify functional and safe performance. You must perform a more thorough inspection, including the cable, strain relief, and connector, each time you clean the probe.
- Before inserting the connector into the probe port, inspect the probe connector pins. If a pin is bent, do not use the probe until it has been inspected and repaired/replaced by a GE Service Representative.
- **DO NOT** kink, tightly coil, or apply excessive force on the probe cable. Insulation failure may result.
- Electrical leakage checks should be performed on a routine basis by GE Service or qualified hospital personnel. Refer to the service manual for leakage check procedures.

Mechanical hazards

CAUTION

A defective probe or excessive force can cause patient injury or probe damage:

- Observe depth markings and do not apply excessive force when inserting or manipulating intercavitary probes.
- Inspect probes for sharp edges or rough surfaces that could injure sensitive tissue.
- DO NOT apply excessive force to the probe connector when inserting into the probe port. The pin of a probe connector may bend.

Special handling instructions

Using protective sheaths

CAUTION

Protective barriers may be required to minimize disease transmission. Probe sheaths are available for use with all clinical situations where infection is a concern. Use of legally marketed, sterile probe sheaths is strongly recommended for intra-cavitary and intra-operative procedures. Use of legally marketed, sterile, pyrogen free probe sheaths is REQUIRED for neurological intra-operative procedures.

Instructions. Custom made sheaths are available for each probe. Each probe sheath kit consists of a flexible sheath used to cover the probe and cable and elastic bands used to secure the sheath.

Sterile probe sheaths are supplied as part of biopsy kits for those probes intended for use in biopsy procedures. In addition to the sheath and elastic bands, there are associated accessories for performing a biopsy procedure which are included in the kit. Refer to the biopsy instructions for the specific probes in the Discussion section of this chapter for further information.

Reordering. To reorder sheaths, please contact your local distributor or the appropriate support resource.

CAUTION

Devices containing latex may cause severe allergic reaction in latex sensitive individuals. Refer to FDA's March 29, 1991 Medical Alert on latex products.

CAUTION

Do not use pre-lubricated condoms as a sheath. In some cases, they may damage the probe. Lubricants in these condoms may not be compatible with probe construction.

CAUTION

DO NOT use an expired probe sheath. Before using probe sheaths, verify whether the term of validity has expired.

Endocavitary Probe Handling Precautions

If the sterilization solution comes out of the endocavitary probe, please follow the cautions below.

⚠ CAUTION

Sterilant Exposure to Patient (e.g., Cidex)—Contact with a sterilant to the patient's skin or mucous membrane may cause an inflammation. If this happens, refer to the sterilant's instruction manual.

Sterilant Exposure from Probe Handle to Patient (e.g., Cidex)—DO NOT allow the sterilant to contact the patient. Only immerse the probe to its specified level. Ensure that no solution has entered the probe's handle before scanning the patient. If sterilant comes into contact with the patient, refer the the sterilant's instruction manual.

Sterilant Exposure from Probe Connector to Patient (e.g., Cidex)—DO NOT allow the sterilant to contact the patient. Only immerse the probe to its specified level. Ensure that no solution has entered the probe's connector before scanning the paitent. If sterilant comes into contact with the patient, refer the the sterilant's instruction manual.

Endocavitary Probe Point of Contact—Refer to the sterilant's instruction manual.

Probe handling and infection control

This information is intended to increase user awareness of the risks of disease transmission associated with using this equipment and provide guidance in making decisions directly affecting the safety of the patient as well as the equipment user.

Diagnostic ultrasound systems utilize ultrasound energy that must be coupled to the patient by direct physical contact. Depending on the type of examination, this contact occurs with a variety of tissues ranging from intact skin in a routine exam to recirculating blood in a surgical procedure. The level of risk of infection varies greatly with the type of contact.

One of the most effective ways to prevent transmission between patients is with single use or disposable devices. However, ultrasound transducers are complex and expensive devices that must be reused between patients. It is very important, therefore, to minimize the risk of disease transmission by using barriers and through proper processing between patients.

⚠ CAUTION

Risk of Infection. ALWAYS clean and disinfect the probe between patients to the level appropriate for the type of examination and use FDA-cleared probe sheaths where appropriate. See Chapter 18 for ordering information.

⚠ CAUTION

Adequate cleaning and disinfection are necessary to prevent disease transmission. It is the responsibility of the equipment user to verify and maintain the effectiveness of the infection control procedures in use. Always use sterile, legally marketed probe sheaths for intra-cavitary and intra-operative procedures.

For neurological intra-operative procedures, use of a legally marketed, sterile, pyrogen free probe sheath is REQUIRED. Probes for neuro surgical use must not be sterilized with liquid chemical sterilants because of the possibility of neuro toxic residues remaining on the probe.

Probe Cleaning Process

⚠ CAUTION

You MUST disconnect the probe from the LOGIQ e prior to cleaning/disinfecting the probe. Failure to do so could damage the system.

Cleaning probes

Perform After Each Use

To clean the probe:

1. Disconnect the probe from the ultrasound console and remove all coupling gel from the probe by wiping with a soft cloth and rinsing with flowing water.
2. Wash the probe with mild soap in lukewarm water. Scrub the probe as needed using a soft sponge, gauze, or cloth to remove all visible residue from the probe surface. Prolonged soaking or scrubbing with a soft bristle brush (such as a toothbrush) may be necessary if material has dried onto the probe surface.

⚠ CAUTION

Take extra care when handling the lens face of the Ultrasound transducer. The lens face is especially sensitive and can easily be damaged by rough handling. NEVER use excessive force when cleaning the lens face.

3. Rinse the probe with enough clean potable water to remove all visible soap residue.
4. Air dry or dry with a soft cloth.

⚠ CAUTION

To minimize the risk of infection from blood-borne pathogens, you must handle the probe and all disposables which have contacted blood, other potentially infectious materials, mucous membranes, and non-intact skin in accordance with infection control procedures. You must wear protective gloves when handling potentially infectious material. Use a face shield and gown if there is a risk of splashing or splatter.

Cleaning probes (continued)

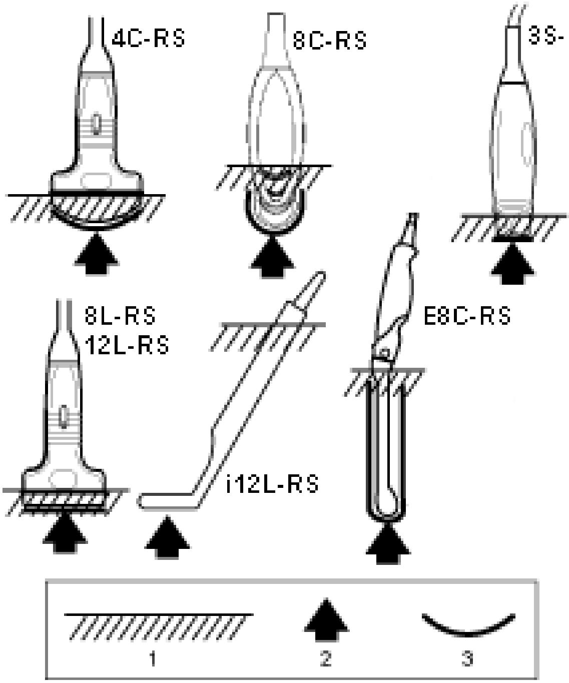

4C-RS
8C-RS
3S-RS
8L-RS
12L-RS
i12L-RS
E8C-RS
1
2
3

Figure 17-5. Probe Immersion Levels

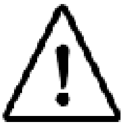
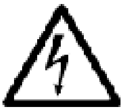
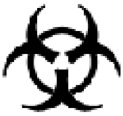
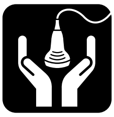
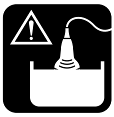
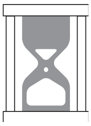
1. Fluid Level
2. Aperature
3. Contact face within Patient Environment

Disinfecting probes

Perform After Each Use

Ultrasound probes can be disinfected using liquid chemical germicides. The level of disinfection is directly related to the duration of contact with the germicide. Increased contact time produces a higher level of disinfection.

Table 17-5: Description of Pictogram on Care card

Pictogram	Description
	"ATTENTION" - Consult accompanying documents" is intended to alert the user to refer to the operator manual or other instructions when complete information cannot be provided on the label.
	"CAUTION" - Dangerous voltage" (the lightning flash with arrowhead) is used to indicate electric shock hazards.
	Biohazard - Patient/user infection due to contaminated equipment. Usage • Cleaning and care instructions • Sheath and glove guidelines
	Ultrasound probes are highly sensitive medical instruments that can easily be damaged by improper handling. Use care when handling and protect from damage when not in use.
	Do not immerse the probe into any liquid beyond the level specified for that probe. Refer to the user manual of the ultrasound system.
	Since there is a possibility of having negative effects on the probe, observe the specified immersing time by the germicide manufacturer strictly. Do not immerse the probe in liquid chemical germicides more than the time prescribed in the care card.

Disinfecting probes (continued)

CAUTION

Review the probe care card that is packed with each probe. The following website contains the most current and up-to-date recommendations:

http://www.gehealthcare.com/usen/ultrasound/products/probe_care.html

Cidex Plus has been approved for all probes available on the LOGIQ e.

Pera Safe high level disinfectant has been approved for the E8C-RS, 8C-RS and 12L-RS probes.

T-spray low-level disinfectant has been approved for the E8C-RS, 8C-RS, 12L-RS, 3S-RS and 8L-RS probes. T-Spray II has been approved for all the probes available on the LOGIQ e.

Disinfecting probes (continued)

⚠ CAUTION

In order for liquid chemical germicides to be effective, all visible residue must be removed during the cleaning process. Thoroughly clean the probe, as described earlier before attempting disinfection.

You MUST disconnect the probe from the LOGIQ e prior to cleaning/disinfecting the probe. Failure to do so could damage the system.

DO NOT soak probes in liquid chemical germicide for longer than is stated by the germicide instructions for use. Extended soaking may cause probe damage and early failure of the enclosure, resulting in possible electric shock hazard.

1. Prepare the germicide solution according to the manufacturer's instructions. Be sure to follow all precautions for storage, use and disposal.
2. Place the cleaned and dried probe in contact with the germicide for the time specified by the germicide manufacturer. High-level disinfection is recommended for surface probes and is required for endocavitary and intraoperative probes (follow the germicide manufacturer's recommended time).

⚠ CAUTION

Probes for neuro surgical intra-operative use must NOT be sterilized with liquid chemical sterilants because of the possibility of neuro toxic residues remaining on the probe. Neurological procedures must be done with the use of legally marketed, sterile, pyrogen free probe sheaths.

3. After removing from the germicide, rinse the probe following the germicide manufacturer's rinsing instructions. Flush all visible germicide residue from the probe and allow to air dry.

Disinfecting probes (continued)

WARNING

CREUTZFIELD-JAKOB DISEASE

Failure of the probe sheath or direct contact of the probe with dura or any intra-cranial tissue of patients with Creutzfield-Jakob disease requires that the probe be destroyed. There is no effective means for decontamination of the probe. For more information, see the Center of Disease Control and Prevention http://www.cdc.gov/ncidod/hip/sterile/cjd.htm.

Biological Hazard

WARNING

Ultrasound transducers can easily be damaged by improper handling and by contact with certain chemicals. Failure to follow these precautions can result in serious injury and equipment damage.

- Do not immerse the probe into any liquid beyond the level specified for that probe. Never immerse the transducer connector or probe adapters into any liquid.
- Avoid mechanical shock or impact to the transducer and do not apply excessive bending or pulling force to the cable.
- Transducer damage can result from contact with inappropriate coupling or cleaning agents:
  - Do not soak or saturate transducers with solutions containing alcohol, bleach, ammonium chloride compounds or hydrogen peroxide
  - Avoid contact with solutions or coupling gels containing mineral oil or lanolin
  - Avoid temperatures above 60°C.
- Inspect the probe prior to use for damage or degeneration to the housing, strain relief, lens and seal. Do not use a damaged or defective probe.

Coupling gels

WARNING

Do not use unrecommended gels (lubricants). They may damage the probe and void the warranty.

Applying

In order to assure optimal transmission of energy between the patient and probe, a conductive gel or couplant must be applied liberally to the patient where scanning will be performed.

CAUTION

Do not apply gel to the eyes. If there is gel contact to the eye, flush eye thoroughly with water.

Precautions

Coupling gels should not contain the following ingredients as they are known to cause probe damage:

- Methanol, ethanol, isopropanol, or any other alcohol-based product
- Mineral oil
- Iodine
- Lotions
- Lanolin
- Aloe Vera
- Olive Oil
- Methyl or Ethyl Parabens (para hydroxybenzoic acid)
- Dimethylsilicone

Planned Maintenance

The following maintenance schedule is suggested for the system and probes to ensure optimum operation and safety..

Table 17-6: Planned Maintenance Program

Do the Following	Daily	After Each Use	As Necessary
Inspect the Probes	X		X
Clean the Probes		X	X
Disinfect Probes		X	X

Returning/Shipping Probes and Repair Parts

US Department of Transportation and GE Medical Systems policy requires that equipment returned for service MUST be clean and free of blood and other infectious substances.

When you return a probe or part for service (Field Engineer or customer), you need to clean and disinfect the probe or part prior to packing and shipping the equipment.

Ensure that you follow probe cleaning and disinfection instructions provided in the Basic User Manual.

This ensures that employees in the transportation industry as well as the people who receive the package are protected from any risk.

Probe Discussion

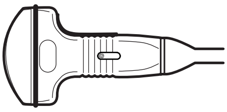
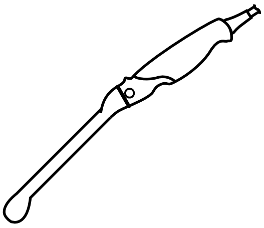
Introduction

The LOGIQ e supports the following types of probes:

- **Curved Array (Convex).** Curved Array (Convex) probes, including `micro' convex, are usually designated by the prefix/suffix "C"; the endocavitary probe is designated by the prefix/suffix "E".
- **Linear Array.** Linear Array probes are designated by the prefix/suffix "L"; the linear intra-operative probes are designated by the prefix/suffix "I" or "T".
- **Phased Array Sector.** Phased Array Sector probes are designated by the prefix/suffix "S"; the biplane TEE probe is designated by the prefix/suffix "B"; the multi-plane TEE probe is designated by the prefix/suffix "T".

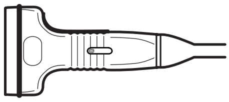
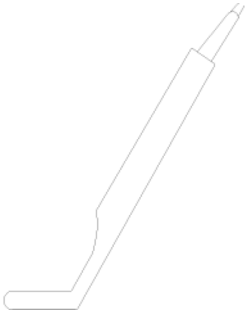
LOGIQ e Convex Probes

Table 17-7: Curved Array (Convex) Probes

Probe	Intended Uses	Capabilities and Features	Illustration
4C-RS	• General Purpose	• Wide field of view • Penetration • Good image uniformity • CFM/Doppler detectability • Biopsy capability • Contrast imaging capability	
E8C-RS	• Transvaginal • Transrectal	• Wide field of view • Small headshell and probe shaft • CFM/Doppler sensitivity • Biopsy capability	
8C-RS	• Pediatrics • Neonatal	• Wide field of view • Good image uniformity • CFM/Doppler detectability	

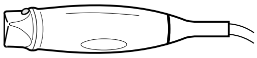
LOGIQ e Linear Probes

Table 17-8: Linear Array Probes

Probe	Intended Uses	Capabilities and Features	Illustration
8L-RS	• Small Parts • Peripheral Vascular	• Wide field of view • Slant scan • Wide field of view for B-Mode resolution & homogeneity • CFM Doppler sensitivity	
12L-RS	• Small Parts • Peripheral Vascular	• Wide field of view • Slant scan • Wide field of view for B-Mode resolution & homogeneity • CFM Doppler sensitivity	
i12L-RS	• Intraoperative • Small Parts • Vascular • Pediatrics	• Low height I-shaped micro-case • Long, light cable • Wide field of view • High resolution • Compound scan	

Sector Probes

Table 17-9: Sector Probes

Probe	Intended Uses	Capabilities and Features	Illustration
3S-RS	• Cardiology • Transcranial • Abdomen	• Small footprint • Wide field of view for B-Mode resolution and homogeneity • CFM Doppler sensitivity	

Biopsy Special Concerns

Precautions Concerning the Use of Biopsy Procedures

WARNING

Do not freeze the image during a biopsy procedure. The image must be live to avoid a positioning error.

Biopsy guidezones are intended to assist the user in determining optimal probe placement and approximate the needle path. However, actual needle movement is likely to deviate from the guideline. Always monitor the relative positions of the biopsy needle and the subject mass during the procedure.

CAUTION

The use of biopsy devices and accessories that have not been evaluated for use with this equipment may not be compatible and could result in injury.

CAUTION

The invasive nature of biopsy procedures requires proper preparation and technique to control infection and disease transmission. Equipment must be cleaned as appropriate for the procedure prior to use.

- Follow the probe cleaning and disinfection procedures and precautions to properly prepare the probe.
- Follow the manufacturer's instructions for the cleaning of biopsy devices and accessories.
- Use protective barriers such as gloves and probe sheaths.
- After use, follow proper procedures for decontamination, cleaning, and waste disposal.

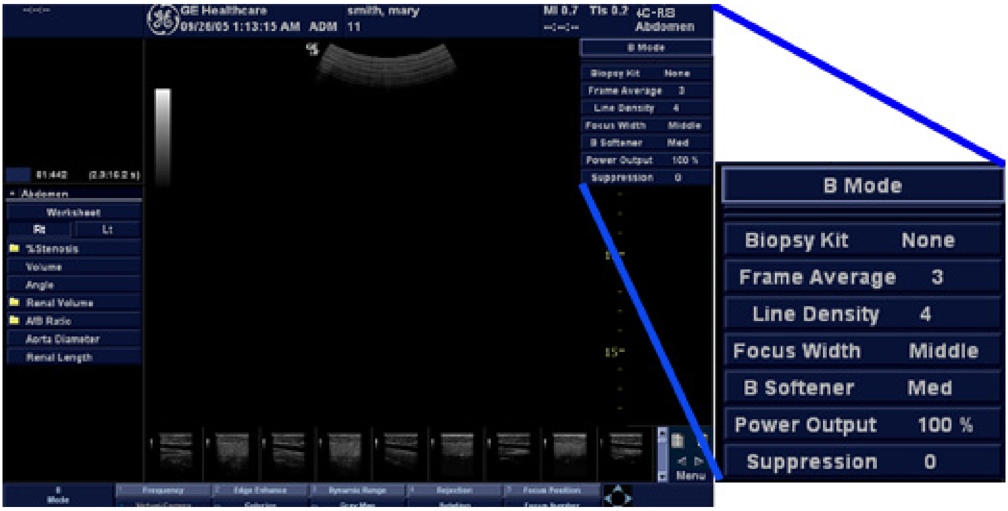
Precautions Concerning the Use of Biopsy Procedures (continued)

CAUTION	Improper cleaning methods and the use of certain cleaning and disinfecting agents can cause damage to the plastic components that will degrade imaging performance or increase the risk of electric shock. See ‘Probe Safety’ on *page 17-9 for more information.*

Preparing for a Biopsy

Displaying the Guidezone

Activate the Biopsy Kit by selecting it from the B-Mode Top/Sub Menu.



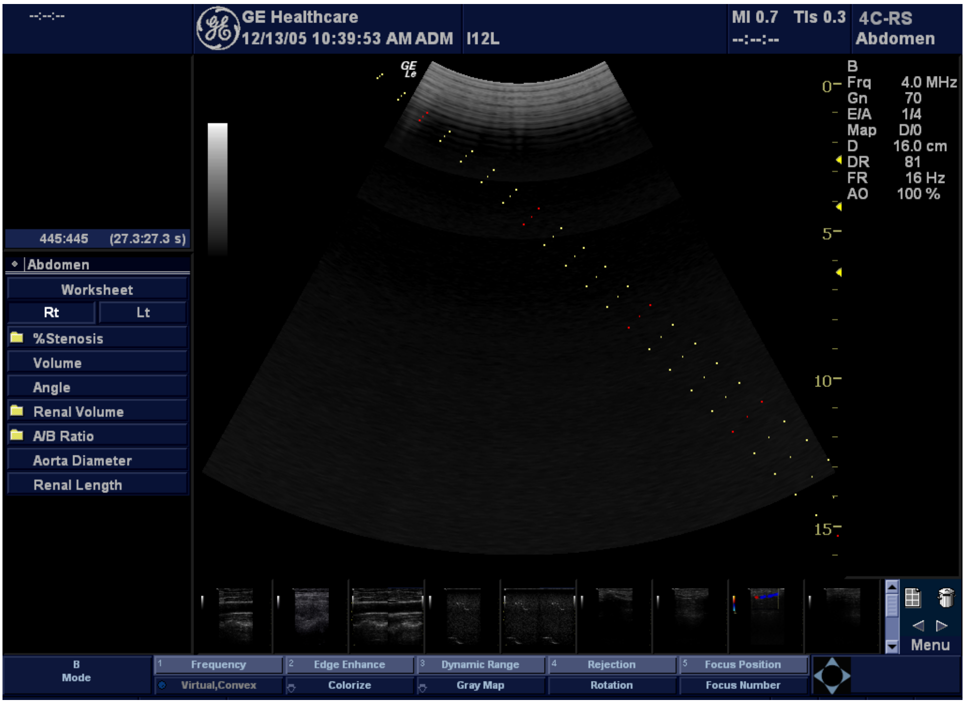
B Mode

Biopsy Kit	None
Frame Average	3
Line Density	4
Focus Width	Middle
B Softener	Med
Power Output	100 %
Suppression	0

Figure 17-6. B-Mode Top/Sub Menu

The available biopsy options appear when Biopsy Kit is selected. There are fixed and adjustable angle biopsy kits available with the LOGIQ e depending on the probe. Select the desired biopsy kit.

Displaying the Guidezone (continued)


--:--:--
GE Healthcare
12/13/05 10:39:53 AM ADM
I12L
MI 0.7
TIs 0.3
4C-RS
Abdomen
--:--:--
445:445 (27.3:27.3 s)
Abdomen
Worksheet
Rt
Lt
%Stenosis
Volume
Angle
Renal Volume
A/B Ratio
Aorta Diameter
Renal Length
0
5
10
15
Menu
B Mode
Frequency
Edge Enhance
Dynamic Range
Rejection
Focus Position
Virtual,Convex
Colorize
Gray Map
Rotation
Focus Number

B
Frq 4.0 MHz
Gn 70
E/A 1/4
Map D/0
D 16.0 cm
DR 81
FR 16 Hz
AO 100 %

Figure 17-7. Biopsy Guidezones for the 4C Probe

The biopsy guidezone represents a path of the needle. The dots which make up the guidezones is the depth readout where:

- Yellow represent 1 cm increments.
- Red represents 5 cm increments.

The display should be carefully monitored during a biopsy for any needle deviation from the center line or guidezone.

NOTE: To set up biopsy guidezones, refer to Table 16-9 for more details.

Displaying the Guidezone (continued)

The needle may vary from the center line or guidezone for various reasons:

- Needle barrel to needle clearance or strength.
- Bracket manufacturing tolerance.
- Needle deflection due to tissue resistance.
- Needle size chosen. Thinner needles may deflect more.

Table 17-10: Biopsy Guide Availability

Probe	**Fixed Angle**	**Multi-Angle**		
		MBX1	**MBX2**	**MBX3**
E8C-RS	15.3			
8L-RS		1.5	3.0	4.0
3S-RS		4.0	5.5	8.0
4C-RS		4.1	6.07	10.05
12L-RS		1.5	2.5	3.5

DANGER

Failure to match the guidezone displayed to the guide may cause the needle to track a path outside the zone.

It is extremely important that when using the adjustable angle biopsy guides, the angle displayed on the screen matches the angle set on the guide, otherwise the needle will not follow the displayed guidezone which could result in repeated biopsies or patient injury.

NOTE: *Although the multi-angle guides are compatible with the Civco Ultrapro and Ultrapro II, it is recommended the multi-angle guides only be used with the Ultrapro II.*

Preparing the Biopsy Guide Attachment

Convex, Sector and Linear probes have optional biopsy guide attachments for each probe. The guide consists of a non-disposable bracket to attach to the probe, disposable needle clip to attach to the bracket, sheath, gel (sterile gel if necessary) and disposable needle barrels.

The disposable needle barrels are available for a variety of needle sizes.

⚠ CAUTION

Please refer to the manufacturer's instructions included in the biopsy kit.

Fixed Needle Biopsy Guide Assembly

1. Identify the appropriate biopsy guide bracket by matching the label on the bracket with the probe to be used.
2. Orient the bracket so that the needle clip attachment will be on the same side as the probe orientation mark (ridge).

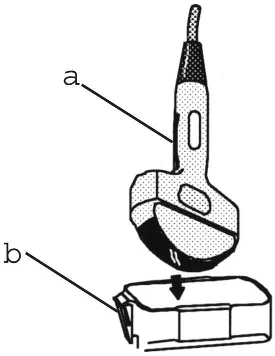


Figure 17-8. Probe/Bracket Alignment

a. Probe Orientation Mark
b. Bracket

3. Attach the biopsy bracket to the probe by sliding the bracket over the end of the probe until it clicks or locks in place.
4. Place an adequate amount of coupling gel on the face of the probe.
5. Place the proper sanitary sheath over the probe and biopsy bracket. Use the rubber bands supplied to hold the sheath in place.

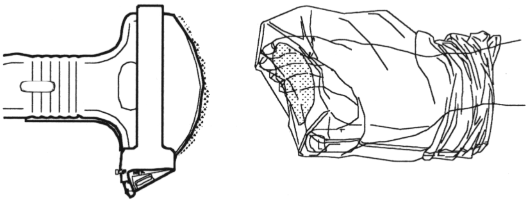


Figure 17-9. Applying Sanitary Sheath

Fixed Needle Biopsy Guide Assembly (continued)

6. Snap the fixed or adjustable needle clip onto the biopsy guide bracket.

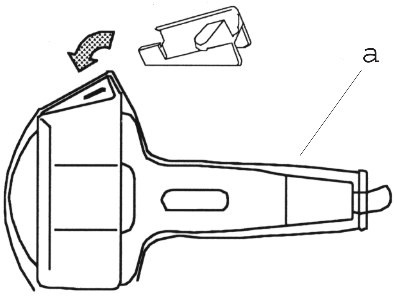


Figure 17-10. Fixed Needle Clip Attachment

a. Sheath

7. Choose the desired gauge (size) needle barrel. Twist it back and forth to remove it from the plastic tree.

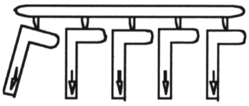


Figure 17-11. Needle Barrel Selection

Fixed Needle Biopsy Guide Assembly (continued)

8. Place the needle barrel into the needle clip with the desired gauge facing the needle clip and snap into place.

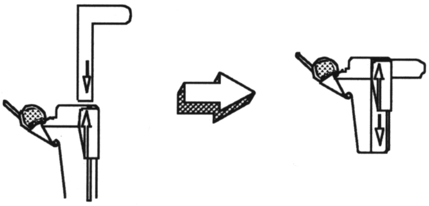


Figure 17-12. Needle Barrel Installation

CAUTION

Ensure that all guide parts are seated properly prior to performing a biopsy.

Multi Angle Biopsy Guide Assembly

WARNING DO NOT attempt to use the biopsy bracket and needle guide until the manufacturer's instructions, provided with the biopsy bracket and needle guide in the kit, have been read and thoroughly understood.

1. Scan the patient and identify the target for biopsy. Move the probe to locate the target to the center of the image. Enable the system biopsy guidezone and try guidezone angles A1 to A3 to decide the best angle setting for needle path.
2. Identify the appropriate biopsy guide bracket by matching the label on the bracket with the probe to be used.

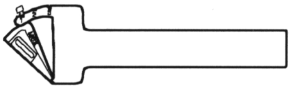


Figure 17-13. Multi-Angle Biopsy Guide Bracket

3. Orient the bracket so that the needle clip attachment will be on the same side as the probe orientation mark (ridge).

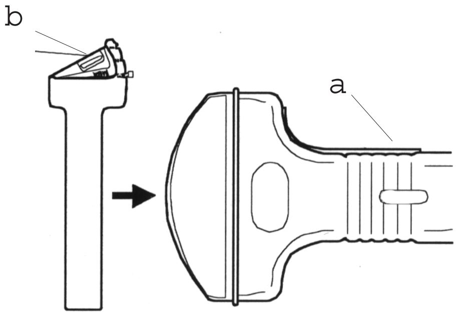


Figure 17-14. Probe/Bracket Alignment

a. Probe Orientation Mark
b. Bracket

4. Attach the biopsy bracket to the probe by sliding the bracket over the end of the probe until it clicks or locks in place.

Multi Angle Biopsy Guide Assembly (continued)

5. Pull up on the knob to freely move the needle guide attachment. Align the knob with the selected position of the needle guide attachment from MBX1, MBX2 and MBX3, to match the guidezone display on the ultrasound system.

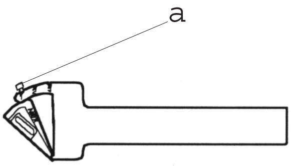


Figure 17-15. Select the angle position

   a. Pull up

6. Push the knob down into the desired slot to secure the angle position of the needle guide attachment.

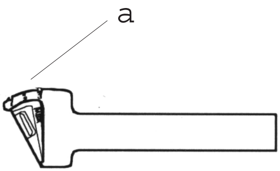


Figure 17-16. Fix the angle position

   a. Push

CAUTION

Hold the bracket in place on the probe when pushing the knob to secure the angle position of the needle guide attachment. Excessive force may cause the bracket to release from the probe.

Multi Angle Biopsy Guide Assembly (continued)

7. Place an adequate amount of coupling gel on the face of the probe.
8. Place the proper sanitary sheath tightly over the probe and biopsy bracket. Use the rubber bands supplied to hold the sheath in place.

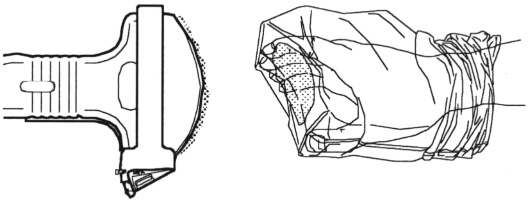


Figure 17-17. Applying Sanitary Sheath

9. Snap the needle clip onto the biopsy guide bracket.

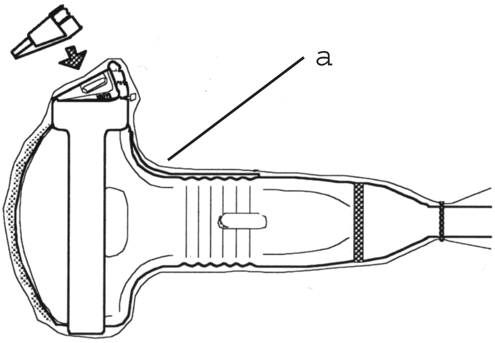


Figure 17-18. Fixing the Needle Clip Attachment

a. Sheath

10. Push the locking mechanism towards the bracket to secure the lock. Make sure the needle guide is firmly attached to the bracket.

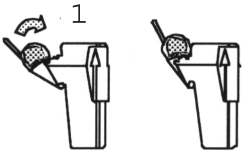


Figure 17-19. Locking the Needle Clip

Multi Angle Biopsy Guide Assembly (continued)

11. Choose the desired gauge (size) needle barrel. Twist it back and forth to remove it from the plastic tree.

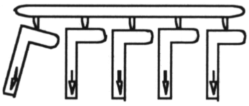


Figure 17-20. Needle Barrel Selection

12. Place the needle barrel into the needle clip with the desired gauge facing the needle clip and snap into place.

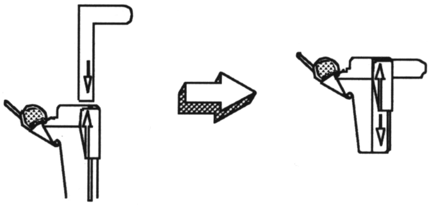


Figure 17-21. Needle Barrel Installation

△ CAUTION

Ensure that all guide parts are seated properly prior to perfoming a biopsy.

Releasing the needle

According to the following procedure, you remove the needle from a probe and an assembly without moving the needle.

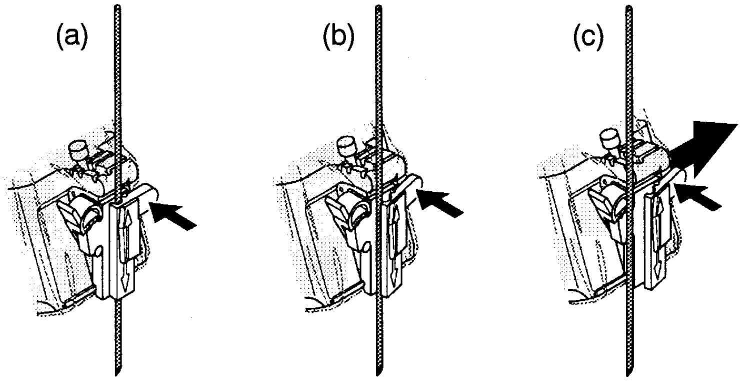


Figure 17-22. Release the needle from assembly

a. Push the knob portion of a sleeve in the direction of the arrow.
b. The needle is released from the assembly.
c. Push the probe and the assembly in the direction of the larger arrow to remove the needle.

Endocavitary Probe Biopsy Guide Assembly

E8C-RS Preparation

When the E8C-RS probe is attached and active, the needle guide type is the TR5° (Civco disposable guide with a 5° offset angle) or the E8C-RU (Convex Biopsy Guide for E8C [reusable]).

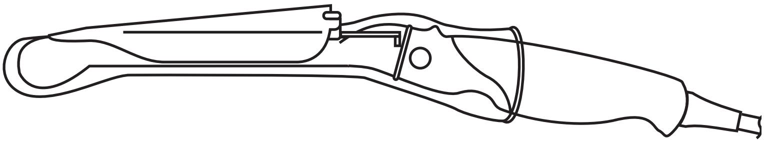


Figure 17-23. TR5° Biopsy Guide

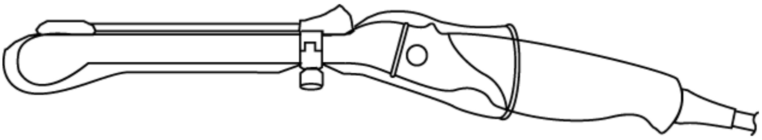


Figure 17-24. Convex Biopsy Guide for E8C-RS (Reusable)

To prepare the E8C-RS for use:

1. Remove the probe from the box and carefully examine it for any damage.
2. If the biopsy guide is to be attached, use the filling removal tool to clean out the attachment area on the probe head.

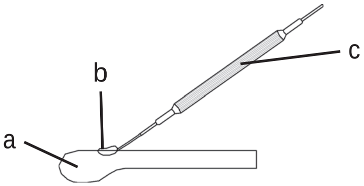


Figure 17-25. Attachment Filling Removal

   a. Probe Head
   b. Attachment
   c. Filling Removal Tool

3. Clean, then disinfect the probe.

NOTE: Ensure that protective gloves are worn.

Installing the sheath

To install the sheath:

1. Remove the sheath from its package. Do not unroll the sheath.

NOTE: *Remember to rinse all sanitary probe sheaths of powder before placing on the probe. Powder can degrade the displayed image.*

2. Place an adequate amount of ultrasound gel inside the sheath tip (the gel is between the sheath inner surface and the probe aperture).

NOTE: *Ensure that only acoustic coupling gel is used for this purpose.*

3. Place the sheath tip over the probe aperture and then pull the sheath end toward the probe handle.
4. Inspect the sheath for nicks, cuts or tears.

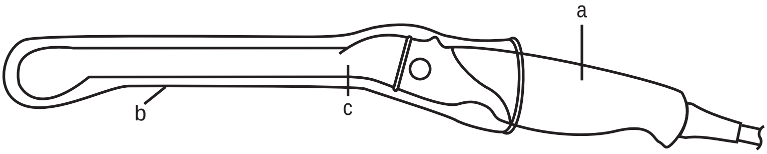


Figure 17-26. E8C-RS Probe with Sheath

a. Probe Handle
b. Sanitary Sheath
c. Probe Body

5. Rub a finger over the tip of the probe to ensure all air bubbles have been removed.

E8C-RS Biopsy Guide Preparation

1. If a biopsy is to be performed, snap the metal or plastic biopsy guide on to the probe over the sheath.

CAUTION

Patient injury or repeated biopsies may result. The needle placement will not be as intended if the needle guide is not properly seated and secure.

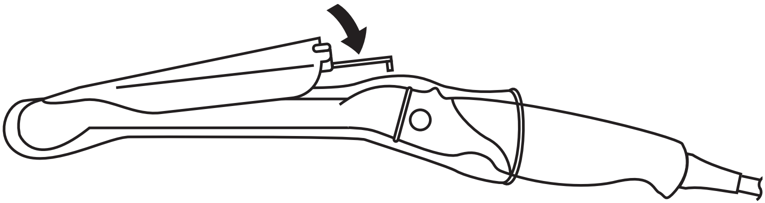


Figure 17-27. Civco Disposable Biopsy Guide 5° Angle

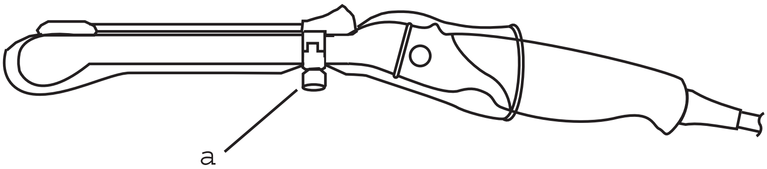


Figure 17-28. Convex Biopsy Guide for E8C (Reusable)

a. Fix with a screw

2. Place an adequate amount of ultrasound gel on the gel-filled sheath tip's outer surface.
3. Ensure the guide is properly seated and secure by pushing forward on the needle insertion end of the guide until the attachment node is firmly in place in it's hole.

WARNING

You MUST select E8C_RU from the Top/Sub Menu when using the reusable E8C biopsy guide.

DO NOT use the needle with the catheter (soft tube). There is a possibility of breaking the catheter in the body.

Biopsy Needle Path Verification

To verify that the path of the needle is accurately indicated within the guidezone on the system monitor, perform the following:

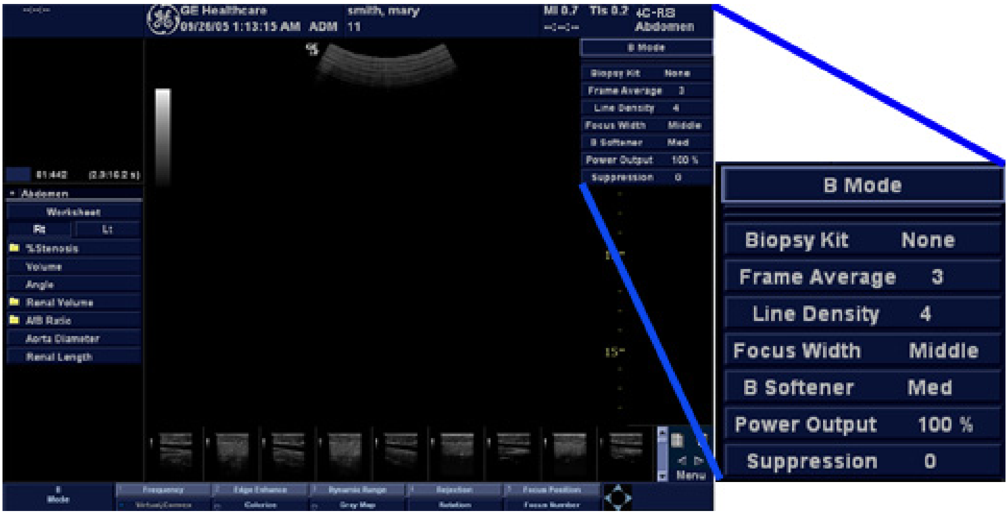
- Properly install the bracket and biopsy guide.
- Scan in a container filled with water (47° C).
- Display the biopsy guidezone on the monitor.
- Ensure that the needle echo falls within the guidezone markers.

The Biopsy Procedure

WARNING

Biopsy procedures must only be performed on live images.

1. Place coupling gel on the scanning surface of the probe/ sheath/biopsy guide assembly.
2. Activate the biopsy guidezone on the system through the B-Mode Top/Sub Menu. When using multi-angle guides, ensure that the proper guidezone angle is displayed.


GE Healthcare
09/26/05 1:13:15 AM ADM
smith, mary
11
MI 0.7 TIs 0.2
4C-RS
Abdomen
Worksheet
Rt
Lt
%Stenosis
Volume
Angle
Renal Volume
A/B Ratio
Aorta Diameter
Renal Length
Menu

B Mode

Biopsy Kit None
Frame Average 3
Line Density 4
Focus Width Middle
B Softener Med
Power Output 100 %
Suppression 0

Figure 17-29. B-Mode Top/Sub Menu

3. Scan to locate the target. Center the target in the electronic guidezone path.

NOTE: *Enabling color flow would allow for visualization of the vascular structure around the area to be biopsied.*

4. Place the needle in the guide between the needle barrel and needle clip. Direct it into the area of interest for specimen retrieval.

Post Biopsy

When the biopsy is complete, remove the needle barrel, needle clip and probe sheath. Properly dispose of these items in accordance with current facility guidelines.

Clean and disinfect the probe. See ‘Probe Cleaning Process’ on *page 17-14 for more information.*

The biopsy bracket can be cleaned and disinfected in a recommended disinfecting agent and reused.

CAUTION

When the biopsy needle guide kit (UP, UP2 or UP2+) is opened, all parts must be discarded after the procedure whether they have been used or not.

Surgery/Intra-operative Use

Preparing for Surgery/Intra-operative Procedures

Preparing the transducer for intra-operative use follows the same sterile procedure as for biopsy use except that no biopsy attachments are used. See 'Preparing the Biopsy Guide Attachment' on *page 17-30 for more information.* Sterile gel is applied to the transducer face and a sterile sheath completely covers the transducer and cable which has first undergone a thorough cleaning and high-level disinfection.

The invasive nature of biopsy procedures requires proper preparation and technique to control infection and disease transmission. Equipment must be cleaned as appropriate for the procedure prior to use.

△ CAUTION

For surgery/intra-operative procedures, a sterile environment is required. Therefore, both the operator and probe needs to be sterile.

Preparing for Surgery/Intra-operative Procedures (continued)

To ensure a sterile environment during the procedure, it is recommended that this be a two-person job.

1. Perform a high level disinfection of the probe.
2. The scanner (surgeon, sonographer, etc.) should be sterile and gloved.
3. Place an adequate amount of sterile coupling gel on the face of the probe.
4. Place the proper sterile sheath over the probe and cord.

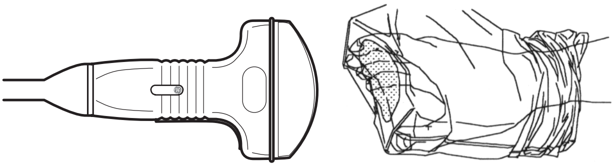


Figure 17-30. Applying Sterile Sheath

5. Depending on the type of procedure, use either sterile water or sterile gel on the sheath cover.

NOTE: *Follow your institutions guidelines on post surgery/intra-operative procedures for probe cleaning and disinfection.*

Chapter 18

User Maintenance

This chapter supplies system data, assistance information, and system care and maintenance instructions.

System Data

Features/Specifications

Table 18-1: Physical Attributes

Dimensions and Weight • Height: 66 mm (2.6 in) console only 94 mm (3.7 in) with handle • Width: 375 mm (14.8 in) • Depth: 287 mm (11.3 in) console only 322.5 mm (12.7 in) with handle • Weight: approx. 4.6 kg (10.04 lb) (with batttery) Keyboard • Ergonomic, intuitive key layout • 'Soft click' hard keys with mechanical and acoustic feedback • Special function keys with additional perceptible marks • Four programmable 'User Define' keys • Back-Lit keys (Freeze only)	Electrical Power AC Adapter (TWADP100) • Voltage:100-240 Vac • Frequency: 50/60 Hz • Power Consumption: 130VA max. • Current: 1.3 Ampere (max.) Console Design • 1 Active Probe Port • Probe cable management Monitor • High performance TFT LCD • 15" display • Opening angle adjustment: 160 degrees (maximum)

Table 18-2: System Overview

Applications
- Abdominal
- Obstetrical
- Gynecological
- Cardiac
- Urological
- Small parts (thyroid and prostate)
- Pediatric
- Vascular
- Neonatal

Standard Features
- Standard CINE Memory
- Automatic Optimization (Auto Tissue Optimization, Auto Spectrum Optimization and Auto Color Optimization)
- ACE
- Built-in patient archive with images, patient information
- Auto Doppler Calculation
- Cardiac Calcs
- OB Calcs
- Fetal Trending
- Multi gestational Calcs
- Gynecological Calcs
- Urological Calcs
- Renal Calcs

Transducer Types
- Electronic Convex Array
- Electronic Micro-convex Array
- Electronic Linear Array
- Endocavitary Electronic Micro-convex

Operating Modes
- B-Mode
- M-Mode
- PW Doppler
- Color Flow Doppler (CFM)
- B/M-Mode
- B/PWD-Mode
- B/CFM

Options
- DICOM 3.0 connectivity
- Insite capability
- CW Doppler
- CMM (Color M-Mode)/AMM (Anatomical M-Mode)
- Easy 3D
- CrossBeam (Compounding)

Accessory Options
- Footswitch
- Battery

Media Options
- DVD-RW
- USB wireless LAN card (Linksys)
- USB memory card (Kingston 512M)

Peripheral Options
- B/W Printer
- Color Printer

Table 18-3: System Parameters

Post-Processing • ATO (Automatic Tissue Optimization) • ADO (Automatic Doppler Optimization) • ACO (Automatic Color Optimization) • 14 B-Mode Grey Maps • 14 M-Mode Grey Maps • Rejection funtion, adjustable from 2 to 20 in 6-digit steps Pre-Processing • B/M-Mode (Gain; TGC; Dynamic Range; Transmission Focus Position; Transmission Focus Number; Transmission Frequency; Edge Enhancement; Image Softener Level; Sweep Speed for M-Mode) • D-Mode (Gain; Dynamic Range; Transmission Frequency; Velocity Scale/PRF; Wall Filter; Baseline Shift; Sweep Speed) • Color Flow (CFM Gain; CFM Velocity Range; MTI Filter; Pulse Packet Size; CFM Spatial Filter; CFM Frame Averaging; Diagnostic Color Display Mode; Baseline Shift; CFM ACE-Filter) Image Processing and Presentation • Image Reverse: Right/ Left • Image Rotation: 2 steps, Rotation: 0 and 180 degrees • Imaging Depth: 2-30cm [Minimum: 2 cm (Zoom); Maximum: 30 cm] • Transmission Focus [1-8 Focus Points selectable; Focus Position: 8 steps (probe independent) • Receiving Focus [CDA/CDF (Continuous Dynamic Focus/Continuous Dynamic Aperture)] • 256 Shades of Grey	Zoom • Smart Zoom (2-times write zoom with increased resolution): Image Archive • Archiving Format: DICOM • Possibly exported to other format CINE Memory/Image Memory • CINE Gauge and CINE Image number display • CINE Review Loop • Selectable CINE Sequence for CINE Review (by Start Frame and End Frame) • Measurements/Calculations & Annotations on CINE Playback Images • Memory Stick

Table 18-4: Measurements and Calculations

B-Mode • Distance • Circumference/ Area • Echo Level • Angle • Ratios • Depth from Probe Surface M-Mode • Distance • Time • Slope • Heart Rate Doppler Measurements/Calculations • Velocity • Frequency • Time • Acceleration • Heart Rate • Auto Doppler Trace function with automatic calculations • Time Averaged Max./ Mean Velocity • Ratios • PI (Pulsatility Index) • RI (Resistivity Index)	Vascular Measurements/Calculations • Summary Worksheet Obstetrics Measurements/Calculations • Gestational Age Calculation • Multi-Gestational Calculation • EFW Calculation • Summary Worksheet • Fetal Trend Graph Gynecology Measurements/Calculations • Summary Worksheet Urology Measurements/Calculation • Summary Worksheet Cardiac Measurements/Calculations • Summary Worksheet

Table 18-5: Probes

• 4C-RS Convex Probe (Applications: Abdomen, OB/GYN, Urology, Small Parts) • 8C-RS Micro Convex Probe (Applications: Neonatal Abdominal, Neonatal Head, Pediatric Abdominal, Pediatric Hip) • i12L-RS Linear Probe (Applications: Intraoperative, Small Parts, Vascular, Pediatrics)	• 8L-RS/12L-RS: Linear Probe (Application: Small Parts, Vascular, Biopsy) • E8C-RS Micro Convex Endocavity Probe (Applications: Obstetrics, Gynecology, Urology) • 3S-RS: Sector Probe (Application: Cardiac, Transcranial)

Table 18-6: Inputs and Outputs Signal

• Video Out (VGA)	• Connectors [USB port (1, 2)] • Ethernet LAN Port

Clinical Measurement Accuracy

Basic Measurements

The following information is intended to provide guidance to the user in determining the amount of variation or measurement error that should be considered when performing clinical measurements with this equipment. Error can be contributed by equipment limitations and improper user technique. Be sure to follow all measurement instructions and develop uniform measurement techniques among all users to minimize the potential operator error. Also, in order to detect possible equipment malfunctions that could affect measurement accuracy, a quality assurance (QA) plan should be established for the equipment that includes routine accuracy checks with tissue mimicking phantoms.

Please be advised that all distance and Doppler related measurements through tissue are dependent upon the propagation velocity of sound within the tissue. The propagation velocity usually varies with the type of tissue, but an average velocity for soft tissue is assumed. This equipment is designed for, and the accuracy statements listed on are based on, an assumed average velocity of 1540 m/s. The percent accuracy when stated applies to the measurement obtained (not the full scale range). Where the accuracy is stated as a percent with a fixed value, the expected inaccuracy is the greater of the two.

Basic Measurements (continued)

Table 18-7: System Measurements and Accuracies

Measurement	Units	Useful Range	Accuracy	Limitations or Conditions
Depth	mm	Full Screen	±5% or 1 mm	
Distance:				
Axial	mm	Full Screen	±5% or 1 mm	
Lateral	mm	Full Screen	±5% or 2 mm	Linear Probes
Lateral	mm	Full Screen	±5% or 4 mm	Convex Probes
Lateral	mm	Full Screen	±5% or 4 mm	Sector Probes
Circumference:			±5% or 1 mm	
Trace	mm	Full Screen	±10% or 1 mm	
Ellipse	mm	Full Screen	±5% or 1 mm	
Area:			±5% or 1 mm	
Trace	mm^2	Full Screen	±5% or 1 mm^2	
Ellipse	mm^2	Full Screen	±5% or 1 mm^2	
Time	s	Timeline Display	±5% or 10 ms	M or Doppler Mode
Slope	mm/s	Timeline Display	±5% or 1 mm/s	M-Mode Only
Doppler SV Position	mm	Full Screen	±2 mm	Any Direction
Velocity	cm/s	From 0 to 100 cm/s From 100 to 130 cm/s	±10% or 1 cm/s ±5% or 1 cm/s 50%	PW Doppler Mode Color Flow Mode
Doppler Angle Correction	cm/s	From 0-60° From 60-80°	±5% ±12%	

Clinical Calculation Accuracy

Estimate the overall inaccuracy of a combined measurement and calculation by including the stated inaccuracy from the basic measurement accuracy statements.

CAUTION

Diagnostic errors may result from the inappropriate use of clinical calculations. Review the referenced source of the stated formula or method to become familiar with the intended uses and possible limitations of the calculation.

Calculation formulas and databases are provided as a tool to assist the user, but should not be considered an undisputed database, in making a clinical diagnosis. The user is encouraged to research the literature and judge the equipment capabilities on an ongoing basis in order to assess its utility as a clinical tool.

System Care and Maintenance

Overview

Refer to Section 10 of the LOGIQ e Service Manual for any additional maintenance guidance.

Contact the local Service Representative for parts or periodic maintenance inspections.

Inspecting the System

Examine the following on a monthly basis:

- Connectors on cables for any mechanical defects.
- Entire length of electrical and power cables for cuts or abrasions.
- Equipment for loose or missing hardware.
- Control panel and keyboard for defects.
- Casters for proper locking operation.

CAUTION

To avoid electrical shock hazard, do not remove panels or covers from console. This servicing must be performed by qualified service personnel. Failure to do so could cause serious injury.

Biological Hazard

If any defects are observed or malfunctions occur, do not operate the equipment but inform a qualified service person. Contact a Service Representative for information.

Weekly Maintenance

The system requires weekly care and maintenance to function safely and properly. Clean the following:

- LCD Monitor
- Operator control panel
- Footswitch
- Printer

Failure to perform required maintenance may result in unnecessary service calls.

Cleaning the system

Prior to cleaning any part of the system:

1. Turn off the system power. If possible, disconnect the power cord. See 'Power Off' on *page 3-29 for more information.*

System Cabinet

To clean the system cabinet:

1. Moisten a soft, non-abrasive folded cloth.
2. Wipe down the top, front, back, and both sides of the system cabinet.

NOTE: *Do not spray any liquid directly into the unit.*

LCD Monitor

To clean the monitor face:

Use a soft, folded cloth. Gently wipe the monitor face.

Do NOT use a glass cleaner that has a hydrocarbon base (such as Benzene, Methyl Alcohol or Methyl Ethyl Ketone) on monitors with the filter (anti-glare shield). Hard rubbing will also damage the filter.

NOTE: *When cleaning the screen, make sure not to scratch the LCD.*

Operator Controls

To clean the operator control panel:

1. Moisten a soft, non-abrasive folded cloth with a mild, general purpose, non-abrasive soap and water solution.
2. Wipe down operator control panel.
3. Use a cotton swab to clean around keys or controls. Use a toothpick to remove solids from between keys and controls.

NOTE: *When cleaning the operator control panel, make sure not to spill or spray any liquid on the controls, into the system cabinet, or in the probe connection receptacle.*

NOTE: *In case of SARS, use bleach, alcohol, or Cidex in a normal diluted form for cleaning/disinfecting the operator panel.*

NOTE: *DO NOT use Tspray or Sani Wipes on the control panel.*

Footswitch

To clean the footswitch:

1. Moisten a soft, non-abrasive folded cloth with a mild, general purpose, non-abrasive soap and water solution.
2. Wipe the external surfaces of the unit then dry with a soft, clean, cloth.

Printer

To clean the printer:

1. Turn off the power. If possible, disconnect the power cord.
2. Wipe the external surfaces of the unit with a soft, clean, dry cloth.
3. Remove stubborn stains with a cloth lightly dampened with a mild detergent solution.

NOTE: *Never use strong solvents, such as thinner or benzine, or abrasive cleansers because they will damage the cabinet.*

No further maintenance, such as lubrication, is required.

To clean the surface of the print head:

1. Run the cleaning sheet (provided with the printer) through the printer.

For more information, see the Printer's Operator Manual.

Other Peripheral Maintenance

Refer to the peripheral manuals for more information.

Battery Replacement and Disposition

Battery replacement every three years is recommended.

Contact a local Service Representative for the replacement of the battery. Used batteries will be discarded appropriately by GE.

NOTE: Disposing of the battery should meet local law and regulatory requirements.

NOTE: Dispose of the system according to local law and regulatory requirements.

Other Maintenance

Replacing illuminated key caps/lamps

Contact a local Service Representative when a key cap or lamp needs to be replaced.

Quality Assurance

Introduction

A good Quality Assurance Evaluation program consists of periodic systematic actions that provide the user with adequate confidence that their diagnostic ultrasound system will produce consistently high quality images and quantitative information.

Therefore, it is in the best interests of every ultrasound user to routinely monitor equipment performance.

The frequency of Quality Assurance evaluations should be based on user's specific needs and clinical practice.

Periodic monitoring is essential in order to detect the performance changes that occur through normal aging of system components. Routine equipment evaluations may also reduce the duration of exams, number of repeat exams, and maintenance time required.

For details on system and peripheral routine preventive maintenance instructions, See ‘System Care and Maintenance’ on *page 18-9 for more information.*

Typical Tests to Perform

Quality assurance measurements provide results relating to system performance. Typically these are:

- Axial Measurement Accuracy
- Lateral Measurement Accuracy
- Axial and Lateral Resolution
- Penetration
- Functional & Contrast Resolution
- Gray Scale Photography.

With these tests, a performance baseline can be set at installation with the phantom in your department. Future test results can be compared to the baseline in order to maintain a record of system performance trends.

Frequency of tests

Quality assurance tests are used to determine whether a scanner is providing the same level of performance from day to day.

The frequency of testing varies with the amount of system usage and modes to be tested. It is recommended that the user perform quality assurance tests at least every three months or every 400 patient studies. Tests should also be performed when a question about system performance exists.

A mobile system may require more frequent tests.

Image quality should also be tested immediately after the following events:

- Service calls
- System upgrades/modifications
- Dropped probe, power surge, etc.

Phantoms

Quality Assurance Evaluations should be done with phantoms and test objects that are applicable to the parameters being evaluated or to the user's clinical practice.

Typical phantoms are composed of material that acoustically mimic human tissue. Pins, anechoic and echogenic targets are physically positioned to provide information for a variety of tests.

Doppler phantoms are currently expensive and complicated to deal with on the user level. If a problem with any Doppler parameters or measurement is suspected, contact a local service representative for evaluation.

The RMI 403GS phantom is still available. Due to the superior penetration and resolution capabilities of GE ultrasound systems, the RMI 405GSX is recommended. It is the most current one available to our field service personnel and will provide the targets and extended life necessary for consistent system testing.

Phantoms (continued)

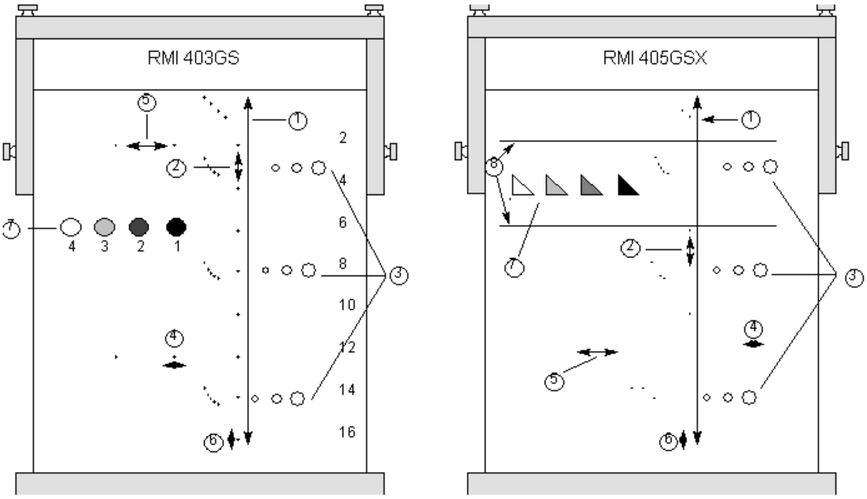

RMI 403GS
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Figure 18-1. Phantoms

1. Penetration
2. Axial Distance Measurement
3. Functional Resolution
4. Lateral Resolution
5. Lateral Distance Measurement
6. Axial Resolution
7. Contrast Resolution and Gray Scale Photography
8. Gray Scale Plane Targets

Baselines

An absolute necessity for a quality assurance program is establishing baselines for each test or check. Baselines are established after the system has been verified to be working properly at installation or after a repair. If a probe or major assembly is replaced, new baselines should be generated.

Baselines can be made by adjusting system parameters to prescribed levels or to the best possible image. The key factor to remember is reproducibility. The same conditions must be reproduced for each periodic check.

All system parameters not displayed on the monitor should be recorded for the permanent record.

Periodic Checks

Periodic checks should be performed in accordance with your facility's quality assurance requirements. For the data to be valid, periodic checks should mimic the baseline setup parameters.

The resulting image, when scanning the phantom exactly as before, should be recorded and compared to the baseline. When a matching image is obtained, it can be assumed that the system performance has not degraded from the baseline.

If a significant difference between the baseline and periodic check is noted, double check the system setup and repeat the test. If the difference between the baseline and periodic check persists, contact a local Service Representative.

Failing to reproduce the control settings as in the baselines will introduce errors in the data and potentially invalidate the results.

Results

Lack of standardization among test instruments, the wide range of acceptance criteria, and incomplete knowledge regarding the significance of certain performance parameters prohibit the establishment of absolute performance criteria for these tests.

Quality Assurance Evaluation results should be compared to previously-recorded results.

Performance trends can then be detected. Unacceptable performance or diminishing trends should be identified for maintenance or repair before a malfunction or inappropriate diagnosis occurs.

The user should determine the best method for recording and archiving the baseline and periodic checks. In most cases the choice is hard copy.

It is important to maintain good consistent records for inspections that may arise, as well as to detect system performance trends.

System Setup

The user should tailor the tests to their particular needs. It is certainly not necessary to make all checks with all probes. A representative example, with the probes used most often by the customer, should be adequate in judging system performance trends.

Use a gray scale phantom as the scan object for the tests. Commercial phantoms are supplied with its own operator manual. Be familiar with proper phantom operating procedures prior to use for quality assurance evaluations.

1. Adjust image monitor. Brightness and contrast should be set to the normal viewing of a good gray scale image.
2. Check all recording devices for proper duplication of image monitor. Ensure that what is seen is what is recorded.
3. Annotate non-displayed image processing controls.
4. Set TGC slide pots to center (detent) position.
5. Place focal zone marker(s) in area of interest for an optimum image.

Test Procedures

The following are recommended Quality Assurance tests. A brief description of the test, the benefit it provides and steps to accomplish the test are supplied.

The importance of recording scan parameters and consistent record keeping cannot be stressed enough. Reproducibility to monitor system trends is the key to quality assurance evaluations.

Using the system's dual image display format is often very convenient and saves recording media.

Axial distance measurements

Description Axial measurements are the distance measurements obtained along the sound beam. See Figure 18-1 for more information.

Benefit The accurate measurement of the size, depth and volume of a structure is a critical factor in determining a proper diagnosis. Most imaging systems use depth markers and/or electronic calipers for this purpose.

Method Axial distance should be measured in the near, mid and far fields as well as in zoom. If necessary, different depths or fields of view can be tested.

Procedure To measure axial distance:

1. Scan a test phantom with precisely-spaced vertical pin targets. Adjust all scan controls, as necessary, for the best image of the pin targets to typical depths for the probe being used.
2. Press **Freeze** to stop image acquisition and perform a standard distance measurement between the pins at different points in the image. Record all images for archiving.
3. Scan the vertical pins in zoom or at different depth/scale factors.
4. Press **Freeze** to stop image acquisition; repeat the distance measurements between pins and record the images for archiving.
5. Document the measurements for reference and future comparison.

Contact a Service Engineer if vertical measurements differ by more than 1.50% of the actual distance.

Lateral distance measurements

Description

Lateral measurements are distance measurements obtained perpendicular to the axis of the sound beam. See Figure 18-1 for more information.

Benefit

The purpose is the same as vertical measurements. Precisely-spaced horizontal pin targets are scanned and results compared to the known distance in the phantom.

Method

Lateral distance should be measured in the near, mid and far fields as well as in zoom. If necessary, different depths of fields of view can be tested.

Procedure

To measure lateral distance:

1. Scan a test phantom with precisely-spaced horizontal pin targets. Adjust all scan controls, as necessary, for the best image of the pin targets from side to side.
2. Press **Freeze** to stop image acquisition and perform a standard distance measurement between the pins at different points in the image. Record all images for archiving.
3. Scan the horizontal pins in zoom or at different depth/scale factors.
4. Press **Freeze** to stop image acquisition; repeat the distance measurements between pins and record the images for archiving.
5. Document the measurements for reference and future comparison.

Contact a Service Engineer if horizontal measurements differ by more than 3mm or 3% of that depth, whichever is greater.

Axial resolution

Descprition Axial resolution is the minimum reflector separation between two closely-spaced objects to produce discrete reflections along the axis of the sound beam. It can also be monitored by checking the vertical size of known pin targets. See Figure 18-1 for more information.

Axial resolution is affected by the transmitting section of the system and the probe.

Benefit In clinical imaging, poor axial resolution displays small structures lying close together as a single dot. This may lead to improper interpretation of the ultrasound image.

Procedure To measure Axial resolution:

1. Scan a test phantom with precisely-spaced vertical pin targets.
2. Adjust all scan controls, as necessary, for the best image of the pin targets to typical depths for the probe being used.
3. Press **Freeze** to stop image acquisition.
4. Perform a standard distance measurement of the pin vertical thickness at different points in the image. Record all images for archiving.
5. Scan the vertical pins in zoom or at different depth/scale factors.
6. Press **Freeze** to stop image acquisition; repeat the vertical thickness measurements of the pins and record the images for archiving.
7. Document the measurements for reference and future comparison.

Axial resolution should remain stable over time. Contact a Service Engineer if any changes are observed.

Lateral resolution

Description Lateral resolution is the minimum reflector separation between two closely spaced objects to produce discrete reflections perpendicular to the axis of the sound beam. It can also be monitored by checking the horizontal size of known pin targets. See Figure 18-1 for more information.

Lateral resolution is dependent upon the beam width produced by the probe. The narrower the beam, the better the lateral resolution.

The beam width is affected by the frequency, degree of focusing, and distance of the object from the face of the probe.

Benefit Clinically, poor lateral resolution will display small structures lying close together as a single dot. This may lead to improper interpretation of the ultrasound image.

Procedure To measure lateral resolution:

1. Scan a test phantom with precisely-spaced horizontal pin targets.
2. Adjust all scan controls, as necessary, for the best image of the pin targets from side to side.
3. Press **Freeze** to stop image acquisition and perform a standard distance measurement of the horizontal thickness of a pin at different points in the image. Record all images for archiving.
4. Scan the horizontal pins in zoom or at different depth/scale factors.
5. Press **Freeze** to stop image acquisition; repeat the horizontal thickness measurements of the pins and record the images for archiving.
6. Document the measurements for reference and future comparison.

Pin width should remain relatively constant over time ("1mm). Dramatic changes in pin width may indicate beamforming problems. Contact a Service Engineer if beam width changes consistently over 2 to 3 periodic tests.

Penetration

Description Penetration is the ability of an imaging system to detect and display weak echoes from small objects at large depths. See Figure 18-1 for more information.

Penetration can be affected by the system's:

- Transmitter/receiver
- Degree of probe focusing
- Attenuation of the medium
- Depth and shape of reflecting object
- Electromagnetic interference from local surroundings.

Benefit Weak reflecting echoes are commonly produced from the internal structure of organs. Definition of this tissue texture is important in the interpretation of the ultrasound findings.

Method Scan a phantom to see how echoes begin to fade as depth is increased. The maximum depth of penetration is the point at which homogeneous material in the phantom begins to lose brightness.

Procedure To measure penetration:

1. Set the front panel TGC slide pots to their center (detent) position.
2. Gain and acoustic output can be adjusted, as necessary, since these values are displayed on the monitor.
3. Scan a test phantom along the vertical pin targets to typical depths for the probe being used.
4. Perform a standard distance measurement from the top of the image displayed to the point at which homogeneous material in the phantom begins to lose brightness.
5. Document the depth measurement for reference and future comparison.

Contact a Service Engineer if the depth of penetration shifts more than one centimeter (1cm) when using the same probe and same system settings.

Functional resolution

Description

Functional resolution is an imaging system's ability to detect and display the size, shape, and depth of an anechoic structure, as opposed to a pin target. See Figure 18-1 for more information.

The very best possible image is somewhat less important than reproducibility and stability over time. Routine tests at the same settings should produce the same results.

Benefit

The data obtained will give a relative indication of the smallest structure the system is capable of resolving at a given depth.

Procedure

To measure functional resolution:

1. Set the front panel TGC slide pots to their center (detent) position.
2. Gain and acoustic output can be adjusted as necessary, since these values are displayed on the monitor.
3. Scan a test phantom with a vertical row of anechoic cyst targets to typical depths for the probe being used.
4. Evaluate the cysts at various depths for a good (round) shape, well-defined borders and no fill in. Remember, TGC slide pots are centered and should remain fixed. This may NOT provide optimal cystic clearing.
5. Document all results for future reference and comparison.

Contact a Service Engineer if a greatly distorted image is obtained.

Contrast resolution

Description Contrast resolution is the ability of an imaging system to detect and display the shape and echogenic characteristics of a structure. See Figure 18-1 for more information.

Specific values measured are less important than stability over time. Routine tests at the same settings should produce the same results.

Benefit A correct diagnosis is dependent upon an imaging system's ability to differentiate between a cystic or solid structure versus echo patterns from normal surrounding tissue.

Method A phantom with echogenic targets of different sizes and depths should be used.

Procedure To measure contrast resolution:

1. Set the front panel TGC slide pots to their center (detent) position. Set dynamic range to 54 db.
2. Gain and acoustic output can be adjusted, as necessary, since these values are displayed on the monitor.
3. Scan a test phantom with echogenic targets at the depths available.
4. Evaluate the echogenic targets for contrast between each other and between the surrounding phantom material. Remember, TGC slide pots are centered and should remain fixed. This may NOT provide an optimal scan image.
5. Document all results for future reference and comparison.

Contact a Service Engineer if the echogenic characteristics or shapes of the targets appear distorted.

Gray Scale photography

Description Poor photography will cause loss of low level echoes and the lack of contrast between large amplitude echoes. See Figure 18-1 for more information.

Benefit When photographic controls and film processors are properly adjusted, weak echoes, as well as strong echoes, are accurately recorded on film.

Procedure

1. Adjust the camera according to the manufacturer's instructions until the hard copy and video display are equal.
2. Scan the phantom and it's echogenic contrast targets.
3. Make a hard copy photograph of the display and compare it to the image on the video monitor for contrast and weak echo display.
4. Document all results for future reference and comparison.

Contact a Service Engineer if camera cannot duplicate what is on the image monitor.

NOTE: *Optimization of brightness/contrast controls on the display monitor is imperative in order to make sure that the hardcopy and monitor look alike.*

The display monitor is adjusted first. The hardcopy camera or printer is adjusted to match the display monitor.

Setting up a Record Keeping System

Preparation

The following is needed:

- Quality Assurance binder.
- Hard copy or electronic file of images.
- Quality Assurance Checklists.
- Display the following information while testing quality assurance:
  - Acoustic Output
  - Gain
  - Depth
  - Probe
  - Dynamic Range
  - Set up new patient to be the name of the test.
- Annotate the following:
  - Any control where its value is **NOT** displayed.
  - Significant phantom information.

Record Keeping

Complete the following:

1. Fill out the Ultrasound Quality Assurance Checklist for each probe, as scheduled.
2. Make a hard copy or archive the image.
3. Compare images to baseline images and acceptable values.
4. Evaluate trends over previous test periods.
5. File hard copy or electronic file of images and checklist in Quality Assurance binder.

Ultrasound Quality Assurance Checklist

Table 18-8: Ultrasound Quality Assurance Checklist (Part 1)

Performed By		Date
System		Serial Number
Probe Type	Probe Model	Serial Number
Phantom Model	Serial Number	Room Temperature
Acoustic Output	Gain	Focal Zone
Gray Map	TGC	Depth
Monitor Setting		
Peripheral Settings		
Other Image Processing Control Settings		

Table 18-9: (Part 2)

Test	Baseline Value Range	Tested Value	Image Hardcopy/ Archived	Acceptable? Yes/No	Service Called (Date)	Date Resolved
Vertical Measurement Accuracy						
Horizontal Measurement Accuracy						
Axial Resolution						
Lateral Resolution						
Penetration						
Functional Resolution						
Contrast Resolution						
Gray Scale Photography						

Supplies/Accessories

CAUTION **DO NOT** connect any probes or accessories without approval by GE.

Not all features or products described in this document may be available or cleared for sale in all markets.

The following supplies/accessories have been verified to be compatible with the system:

Peripherals

Table 18-10: Peripherals and Accessories

Accessory	Unit
Sony B/W Printer (UP-D897 MD)	Each
Sony Digital Color Printer (UP-D23MD)	Each
HP460 Printer	Each
HP K550 PC Printer	Each
DVD R/W (GSA-5163D)	Each
USB Wireless Card (Linksys WUSB54G)	Each
Measure Transfer Kit	Each
USB Memory Stick (Kingston 512M)	Each
USB Hub Assy (HE 702A)	Each
ECG-USB	Each

Console

Table 18-11: Console Accessories

Accessory	Units
Footswitch model FSU-2001	Each
Footswitch model MKF 2- MED GP26	Each
Battery Pack model (TWBP42)	Each

Probes

Table 18-12: Probes and Accessories

Accessory	Units
4C-RS	Each
8C-RS	Each
E8C-RS	Each
i12L-RS	Each
8L-RS	Each
3S-RS	Each
12L-RS	Each

Gel

Table 18-13: Gel

Accessory	Units
Thermasonic Gel Warmer	Holds three plastic bottles (250ml or 8 oz)
Aquasonic 100 Scan Gel	5 liter jug
	250 ml plastic bottles (12/ case)
Scan Ultrasound Gel	8 oz plastic bottles (12/ case)
	1 gallon plastic jug
	Four 1-gallon plastic jugs

Disinfectant

Table 18-14: Disinfectant

Accessory	Units
Cidex Activated Dialdehyde	16/1 quart bottles
	4/1 gallon bottles
	2/2.5 gallon bottles

Ultrasound Probe and Cord Sheath Sets

Table 18-15: Probe and Cord Sheath Sets

Accessory	Units
Sterile Ultrasound Probe Sheath Set	20 Per Set
Sterile Ultrasound Cord Sheath Set	20 Per Set
Sanitary Rectal/Vaginal Probe Cover	20 Per Set
Sterile Combination Probe and Cord Cover Set	12 Per Set
Sterile Ultrasound Probe Sheath Set for Wide (2.5 and 3.5) Aperture Sector Probes	20 Per Set

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